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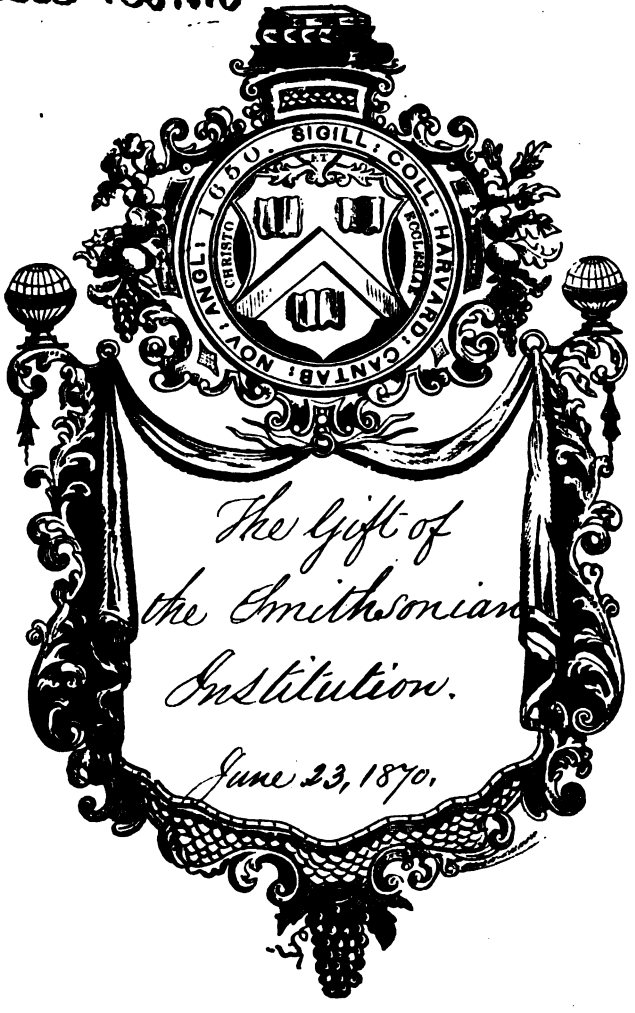

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SMITHSONIAN MISCELLANEOUS COLLECTIONS.
219

MONOGRAPHS

OF THE

DIPTERA

OF

NORTH AMERICA.

PART IV.

PREPARED FOR THE SMITHSONIAN INSTITUTION

BY

R. OSTEN SACKEN.

WASHINGTON:
SMITHSONIAN INSTITUTION.
JANUARY, 1869.

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THE present publication is the fourth part of a work on the Diptera of North America. It has been prepared at the request of the Smithsonian Institution by Baron R. Osten Sacken, and is based almost exclusively on his own collections.

Parts I and II of the series were written by Dr. H. Loew, of Meseritz, Prussia, principally from the examination of specimens furnished by Baron Osten Sacken. Part III, also by Dr. Loew, is in an advanced state of preparation. The work is published in successive monographs of families and genera, when sufficient material is on hand for illustrating particular groups, without reference to systematic sequence.

JOSEPH HENRY,
Secretary S. I.

SMITHSONIAN INSTITUTION,
WASHINGTON, December, 1868.

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PREFACE.

Διὸ δεῖ μὴ δυσχεραίνειν παιδικῶς τὴν περὶ τῶν ἀτιμοτέρων ζῴων ἐπίσκεψιν. Ἐν πᾶσι γὰρ τοῖς φυσικοῖς ἔνεστί τι θαυμαστόν· καὶ καθάπερ Ἡράκλειτος λέγεται πρὸς τοὺς ξένους εἰπεῖν τοὺς βουλομένους ἐντυχεῖν αὐτῷ, ὁὲ ἐπειδὴ προσιόντες εἶδον αὐτὸν θερόμενον πρὸς τῷ ἵπνῳ ἔστησαν (ἐκέλευε γὰρ αὐτοὺς εἰσιέναι θαρροῦντας· εἶναι γὰρ καὶ ἐνταῦθα θεούς), οὕτω καὶ πρὸς τὴν ζήτησιν περὶ ἑκάστου τῶν ζῴων προσιέναι δεῖ μὴ δυσωπούμενον ὡς ἐν ἅπασιν ὄντος τινὸς φυσικοῦ καὶ καλοῦ.

(Wherefore we ought not childishly to neglect the study even of the most despised animals, for in all natural objects there lies something marvellous. And as it is related of Heraclitus that certain strangers who came to visit him, when they found him warming himself at the kitchen-fire, stopped short—he bade them enter without fear, for there also were the gods: so we ought to enter without false shame in the examination of all living beings, for in all of them resides something of nature and beauty.)

ARISTOTELES, *de partibus animalium*, I, 5.

The present volume contains the first part of a monograph of the North American *Tipulidæ*, that is, the *Tipulidæ brevipalpi*, the *Cylindrotomina*, and *Ptychopterina*. The *Tipulidæ longipalpi* are reserved for another volume.

The ground covered in this monograph is the same as that of my former essay: *New genera and species of the North American Tipulidæ with short palpi, with an attempt at a new classification of the tribe* (in the *Proceedings of the Academy of Natural Sciences of Philadelphia*, 1859), that is, it embraces all the known North American species,[1] at the exclusion of those from the West

[1] The described species belong to the Atlantic States of the Union; only two Californian species have been added.

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Indies and Mexico. But if, instead of the sixty pages which the above-mentioned essay contains, the present volume fills nearly three hundred and sixty, this is owing partly to the increase of materials at my disposal, partly to the much greater development which I have given to the paragraphs concerning the classification. When, in 1859, I adopted an entirely new distribution of the *Tipulidæ*, I considered it as only provisional, because it was based exclusively on North American species. Since then, however, it has proved available in a more general application, and has been introduced by Dr. Schiner in the European fauna. I have therefore deemed it necessary to explain my views on that distribution with more accuracy, and have treated the classification with almost as much detail as if I was writing, not a faunistic, but a general monograph of the family. I only regret that my opportunities for studying the European fauna have been so limited. As to the *Tipulidæ* from the other parts of the world, besides Europe and North America, they are hardly known at all. The little I have seen of them in the principal museums of London, Paris, Berlin, and Turin, has been made use of by me.

My principal collecting grounds have been the environs of Washington, D. C., and of New York. I have made occasional excursions to different parts of the States of New York and Pennsylvania and in New England; moreover, I have received contributions from my friends in New England, and not unimportant collections from the northwestern region of this continent, sent by the lamented Robert Kennicott. Thus, as far at least as the more common species are concerned, the Middle and Northern States may be said to be tolerably well represented in this volume; less so, the region west of the Alleghanies and the British Possessions. The country south of Washington is almost unexplored.

I owe a debt of deep gratitude to my friend Mr. Samuel Powel, in Newport, R. I., who devoted a great deal of valuable time to the preparation of magnified photographs of the wings, intended to be represented on the plates I and II to this volume. These photographs were transferred to steel by the process of Baron Egloffstein. The plates thus obtained present a degree of fidelity to nature hardly attainable by the ordinary processes. The plates III and IV, drawn by my own unskilful hand, are reproduced from my earlier essay; only the arrangement of the figures on them has been changed.

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The measurements are given in decimal fractions of an inch (as in the former volumes of these monographs).

I am under manifold obligations to my friends Director Loew, of Guben, Prussia, and Dr. Schiner, of Vienna, for their assistance in my work.

R. OSTEN SACKEN.

New York, April, 1868.

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DIPTERA

OF

NORTH AMERICA.

PART IV.

I.

ON THE NORTH AMERICAN TIPULIDÆ.

(PART FIRST.)

INTRODUCTION.

1. *Characters of the family.*

THE *Tipulidæ* belong in the number of those large families of *Diptera*, the limits of which are equally well defined on all sides. In the *Dolichopodidæ* and *Asilidæ* we have instances of families of the same kind, and the words of Mr. Loew about the latter "that not a single dipteron has yet been found, the position of which as belonging or not belonging to this family is questionable"—these words may, with almost equal propriety, be applied to the *Tipulidæ*.

The presence of a transverse V-shaped suture across the mesonotum, would alone be sufficient to distinguish the *Tipulidæ* from the neighboring families. The completeness of the venation and the structure of the ovipositor of the female are of equally general application. Through the whole family, and all the modifications in the other organs notwithstanding, the venation is arranged according to the same plan, the characteristic features of which are, the great length of the two basal cells, the development of the auxiliary vein, and the presence, in the majority of cases, of a discal cell. The veins, in their last subdivisions along the margin of the wing, are from ten to twelve in number (if *Clado-*

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lipes and *Toxorrhina* (Tab. I, f. 6) have only nine veins, the obliteration of a vein is in both cases evident). The *Culicidæ* and *Psychodidæ* come next to the *Tipulidæ* with regard to the completeness of the venation; but they have no discal cell; among all the other *Diptera nemocera*, this cell occurs only in *Rhyphus*.

The size and structure of the ovipositor, with its two pairs of long, horny, pointed valves, is common, with very rare exceptions, to all the *Tipulidæ* (the ovipositor of the other *Diptera nemocera* generally consists of two hardly projecting inconspicuous valvules). The only genera exceptional in this respect are *Cryptolabis* and *Bittacomorpha;* their ovipositors do not show any horny appendages.[1]

These three leading characters of the *Tipulidæ*—thoracic suture, venation, and the structure of the ovipositor—sufficiently isolate this family among the other *Diptera nemocera;* but we render the contrast still more striking, if we direct our attention to the different parts of the organization of the *Tipulidæ*, and compare them with the corresponding parts in other families. Thus the eyes here are rounded or oval, and never excised on the inside (reniform or lunate), like those of most *Culicidæ*, *Chironomidæ*, *Psychodidæ*, *Simulidæ*, and some *Mycetophilidæ*. The ocelli are, with rare exceptions (*Trichocera* and perhaps *Pedicia*), wanting, or, at least, imperceptible; and this character the *Tipulidæ* share with the *Culicidæ*, *Chironomidæ*, *Psychodidæ*, *Simulidæ*, and a part of the *Cecidomyidæ*. The joints of the antennal flagellum are, with rare exceptions, well marked in their divisions, the shape of the whole antenna being in most cases setaceous, that is, gradually attenuated towards the tip. The joints are never absolutely cylindrical, as in some *Cecidomyiæ* (*Asphondylia*, *Spaniocera*), or of the compressed disciform shape, so common among the *Mycetophilidæ;* only *Rhipidia* has them pedicelled (a character common among the *Cecidomyiæ*). The antennal joints are in most cases verticillate (a character very rare among the *Mycetophilidæ*); never bushy (a character of general occurrence among the males of the *Chironomidæ* and *Culicidæ*). With regard to the number of antennal joints, the *Tipulidæ* do not differ much from the other *Nemocera;* the

[1] I have neglected the opportunities I have had to examine the ovipositor of *Bittacomorpha* on fresh specimens; in dry ones, I perceive only a pair of short, coriaceous appendages.

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great majority of them have 2 + 11, 2 + 12 or 2 + 14 joints; the great majority of the *Mycetophilidæ* have 2 + 14, the *Culicidæ* 2 + 12, the *Chironomidæ* from 2 + 10 to 2 + 13 (in the male sex; much less in the female); the *Cecidomyidæ* 2 + 12, or double this number, 2 + 24.

The feet of the *Tipulidæ* are comparatively much longer than those of the other families of *Diptera nemocera* (except perhaps the *Blepharoceridæ*); but the coxæ are never so long as in the *Mycetophilidæ*, the femora never dentate, as in *Ceratopogon;* the tibiæ, although often spurred at the tip, are never beset with spines, as in the majority of the *Mycetophilidæ*. The ungues have sometimes teeth on the under side, like those of some *Chironomidæ* and *Mycetophilidæ;* empodia are often distinct, but pulvilli, like those of *Bibio*, have not been observed.

In size, the majority of the *Tipulidæ* are considerably larger than the other *Diptera nemocera*, and the contrast in this respect is very striking.

Among the families usually placed in the vicinity of the *Tipulidæ*, the *Blepharoceridæ* alone may have a claim to a distant relationship with them. In the structure of the incomplete thoracic suture of *Blepharocera*, I perceive, if I am not mistaken, an approach to the *Ptychopterina;* but as my knowledge of the *Blepharoceridæ* is confined to a single species, I would not insist upon this relationship. The *Blepharoceridæ* have three ocelli and a peculiar venation; the inner horny parts of the mouth of *Blepharocera* are much more developed than those of the *Tipulidæ;* and the eyes are divided by a distinct cross-line into two portions, one with large, the other with small facets; a character which I have never observed among the *Tipulidæ*.

The connection between the *Psychodidæ* and the *Eriopterina* is of a very obscure kind, and unless further developed by observation, cannot have any scientific value.

The position of the genus *Chionea* among the *Tipulidæ*, is determined chiefly by the structure of its ovipositor, the want of a thoracic suture notwithstanding. Moreover, the relationship of *Chionea* to *Trimicra* is evident.

The case of *Dixa*, likewise deprived of a thoracic suture, is more doubtful. This genus has been referred to the *Mycetophilidæ* by Meigen and Zetterstedt; to the *Tipulidæ* by Macquart and Westwood; Rondani connects it with *Trichocera*,

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and Haliday places it provisionally, together with *Orphnephila*, in an artificial group, *Heteroclitæ*. *Dixa* has no thoracic suture; the ovipositor of the female, according to Mr. Haliday, is different from that of the *Tipulidæ*, consisting of two short, broad, round lamels; the presence of only six longitudinal veins, the shortness of the auxiliary vein, the absence of both subcostal and marginal cross-veins, the peculiar course of the first longitudinal vein, the constant absence of the discal cell, etc., constitute a type of venation which separates *Dixa* from all the known *Tipulidæ* and shows some points of analogy with *Ptychoptera* only. The rather extraordinary larva of *Dixa* (described by Stæger) is one ground more for separating this genus from the *Tipulidæ*. Altogether, I incline to the opinion of Mr. Haliday in leaving *Dixa*, temporarily at least, in an isolated position.

2. *On the larvæ of the Tipulidæ.*

During the larva stage, the species of this family are as well marked among the Diptera, as in the perfect stage of their existence. At the same time, they exhibit a remarkable conformity in the more important parts of their organization, all the differences in the external conditions of their life notwithstanding. About a dozen more or less complete descriptions of such larvæ have been given by former authors,[1] and I have had occasion myself to examine several larvæ of *Limnobia*, *Tipula*, *Pachyrrhina*, and *Ctenophora*. The following account is based upon these data (some more details concerning all the known larvæ of this family will be given under the head of the respective genera):—

The principal character, distinguishing these larvæ from those

[1] Perris, *Ann. Soc. Entom. de Fr.* 1849, p. 331, Tab. VII, f. 4 (*Ula pilosa*); the same, l. c. 1847, p. 37, Tab. I, f. 3 (*Trichocera*); the same, l. c. 1849, p. 331, Tab. VII, f. 5 (*Limnophila dispar*); *Chionea* by Brauer (*Verh. Zool. Bot.* Ver. 1854); *Cylindrotoma* in Schellenberg, *Genres de Mouches Dipt.*, and in Zeller, *Isis*, 1842, p. 808; *Phalacrocera* in Degeer; *Ptychoptera* in Réaumur and Lyonnet; *Ctenophora* in Fischer, *Oryctogr. du Gouvt. de Moscou*, Bouché, etc.; *Tipula* in Réaumur, Degeer, Bouché, etc. Besides the detailed descriptions, numerous short notices about single larvæ are scattered in the different authors. I cannot refrain from noticing here, that what Mr. Heeger describes as the larva of *Limnobia platyptera* Macq. (*Sitzungsber. der Wien. Acad.* Vol. XI, 1853) is a Mycetophilideous larva, probably *Bolitophila*.

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of the neighboring families is, that as far as known they are metapneustic, that is, they have a single pair of spiracles at the anal end of the body. The genus *Trichocera*, anomalous in many respects, is the only one, provided Mr. Perris' statements are correct, which has two pairs of spiracles, a thoracic and an anal one. A second characteristic peculiarity of these larvæ is the structure of the mentum, which consists of a horny plate, pointed in front, and with several more or less deep indentations on both sides of this central point. I found this organ in all the larvæ which I have dissected; it is entirely different from the corresponding organ in the larvæ of the *Mycetophilidæ* (compare my description of these in the *Proc. Entom. Soc. Phil.* 1862, p. 151, Tab. I).

The head of the larva is comparatively large, imbedded nearly up to the mouth in the first thoracic segment; it consists of a horny shell, open on the under side and in front; the parts of the mouth are inserted in the latter opening. The comparatively large labrum, lapping over the mouth when it is in motion, has a rather complicated structure, partly horny, partly fleshy, varying in the different genera; often, for instance in *Tipula*, with bristles and microscopic hairs in front. The mandibles are horny, very strong (not flat, as in the *Mycetophilidæ*), generally bifid at the tip and often with several indentations on the inner side. The maxillæ are likewise large and stout; more or less fleshy on the inside, but strengthened on the outside by horny plates; they have a short palpus on the outside and the usual lobe, coriaceous, often provided with an entanglement of hairs and bristles, on the inside. The mentum, already alluded to above, is a horny lamel of variable structure; in *Tipula* and *Ctenophora* I have found it triangular in front, the sloping sides bearing several small indentations; in a larva of *Limnobia* this organ had five large teeth in front. Under the mentum, inside of the buccal cavity, I have perceived in the larvæ of *Tipula* and *Ctenophora* another smaller, rounded, horny lamel, with indentations on its anterior side. The plane of this second lamel is parallel to that of the first, and it may be seen moving up and down, when the mouth is in motion. The antennæ, placed on the sides of the mouth, consist of a rounded, fleshy basal piece, and a cylindrical, horny shaft, ending in one or several stout bristles.

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The body of the larvæ is grub-like, of a uniform grayish, brownish, or whitish color. It consists of twelve segments (counting the anal segment among them). The nature of the outer integuments depends on the mode of life of the larva. The larvæ of *Ctenophora*, living in wood, have a soft, white, smooth skin, similar to that of the larvæ of longicorn beetles or of the *Asilidæ*, living in similar conditions. The larvæ of *Tipula*, living in the soil, or the larvæ of those species of *Ctenophora* which are found in wood so far decomposed as to be like soil or vegetable mould, have a much tougher skin, and are covered with a microscopic, appressed pubescence. This toughness, as well as some stiff bristles, scattered over the surface of the skin, is probably useful in burrowing. Thus the larva of *Trichocera*, digging in vegetable mould or in fungi, is covered, according to Perris, with microscopic erect bristles; the larva of *Ula*, living in fungi, has, according to the same author, still longer bristles. The larvæ living in water (as some *Limnobina*) are soft and slimy, of a dirty greenish color, and with a peculiar clothing of appressed microscopic hairs, not unlike those of the larvæ of *Stratiomyia*. The most anomalous of all the Tipulideous larvæ are those of the *Cylindrotomina*. That of the *Cylindrotoma distinctissima* lives upon the leaves of plants, as *Anemone*, *Viola*, *Stellaria*, almost like a caterpillar; it is green, with a crest along the back, consisting of a row of fleshy processes. The larva of *Cylindrotoma* (*Phalacrocera*) *replicata*, according to Degeer, lives in the water, on water-plants, and is distinguished by numerous filaments, which, although resembling spines, are flexible and hollow on the inside. Degeer took them for organs of respiration.

The organs of locomotion of the larvæ generally consist in transverse swellings on the under side of the body provided with exceedingly minute, stiff bristles. Sometimes these swellings run round the whole body; in such a case, their dorsal portion is less developed than the ventral. The anal end of the body is truncate, and the two spiracles are placed upon the truncature. The margins of the latter are for the most part provided with fleshy retractile processes of various size and shape, usually four, sometimes six or more. The truncature can be contracted at the will of the larva, and then the fleshy processes are shortened and the spiracles are inclosed in the cavity thus formed at the end of the

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body. The fleshy processes are sometimes, especially in the *Tipulidæ*, strengthened on the inner side by small horny plates; sometimes they are replaced by horny, pointed processes (I have found a larva of this kind, belonging to *Tipula* or *Pachyrrhina*). The larvæ of some *Ctenophoræ* (as *C. atrata*, *nigricornis*, etc., belonging to the subgenus *Xiphura* Brullé), have no processes at all round the truncature. In the aquatic larvæ of *Ptychoptera*, a long tube at the end of the body, serves for breathing, for which purpose it is raised to the surface of the water.

On the under side of the last segment is the anal opening. Immediately in front of the anus, on the under side of the body, some larvæ, belonging probably to the genus *Tipula*, have a certain number of soft, digitiform, retractile processes, varying in size, shape, and number. (The usual shape is figured in Réaumur, IV, Tab. XIV, f. 10, where there are six large processes; but sometimes they are much smaller.) I do not know the use of these singular organs.

The pupæ of the *Tipulidæ* are extricate, like those of nearly all the *Diptera orthorapha*. The thorax usually bears two horn-like processes, varying in length and structure. They represent the thoracic spiracles. In *Ptychoptera* one of these processes acquires a great length, in order to allow the pupa to breathe under water. The abdominal segments of the pupa are provided with transverse rows of hairs, bristles or spines, which enable the pupa to extricate itself from its place of concealment, preparatory to the escape of the perfect insect. These processes are usually more numerous and stronger in the genera *Tipula*, *Ctenophora*, etc., than among the brevipalpous *Tipulidæ*.

3. *Historical account of the classification of the Tipulidæ.*

The word *Tipula* was used by the Latin classics to designate some long-legged insect, running over the surface of the water, perhaps *Hydrometra*. I have not been able to ascertain when and where this word was first applied to the crane-flies;[1] but it

[1] The quotations from *Plautus*, *Varro* and *Festus* about *Tipula* or *Tippulla*, are to be found in all Latin dictionaries. Aldrovandi, whose work, *De Animalibus Insectis*, appeared in 1602, reproduces these quotations (p. 708), and describes as Tipulæ two water insects; one of them is *Ranatra*, which is also figured; the other is apparently *Hydrometra*. Moufet (*Insect. Theatr.* 1334), under the name of *Tipula*, likewise means *Hydrometra* (p. 169); but in

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was used in this sense some time before Linné introduced the name in his zoological system. His two genera, *Culex* and *Tipula*, embrace the whole of the present *Diptera nemocera*, but, in his arrangement, they were not placed alongside of each other. *Culex*, on account of its long proboscis, was put in the same group with *Empis*, *Conops*, etc.

Fabricius, in his earlier works (*Syst. Entomol.* 1774), followed Linné in adopting these two genera and locating them on account of the structure of their proboscis.

Latreille, in 1802 (*Hist. Natur. des Crustacés et des Insectes*, Vol. III), introduced the name *Tipulariæ* for the division which he afterwards called *Diptera nemocera*, and which he distinguished on account of the structure of the antennæ. The genera admitted by him at that time, besides *Culex* and *Tipula*, were *Ceroplatus*, *Bibio*, *Simulium*, *Scatopse*.

While Fabricius tried to found his arrangement upon the structure of the mouth, Latreille upon the structure of the antennæ, the comparative length of the feet and also the structure of the mouth, Meigen struck in the right direction by showing the importance of the venation. This character enabled him to establish at once a series of genera, which have been retained since. He did it first in an essay (*Versuch einer neuen Gattungseintheilung der europ. zweiflügl. Insecten*, in Illiger's *Magazin*, etc., II, p. 259, 1803), and a year later in his first independent work (*Klassification und Beschreibung der europ. zweifl. Insecten*, 1804). Without introducing any family divisions, these works give a series of definitions of genera. The following genera belonging to our family of *Tipulidæ* are mentioned in this way by Meigen: *Trichocera*, *Erioptera*, *Limonia*, *Tipula*, *Nephrotoma*, *Ptychoptera*, *Ctenophora*. Except *Tipula*, all of them were new.

The fourteenth volume of Latreille's *Hist. Natur. des Crustacés et des Ins.*, containing the Diptera (the third volume, mentioned

another chapter (p. 70) he mentions the word *Tipula* among the Latin names commonly applied to crane-flies. In 1722 Frisch (*Beschr. v. allerl. Ins. in Deutschl.* part IV, p. 24), speaking of the crane-flies, says: "Flies which are called *Tipulæ* by the naturalists who have written before me." Réaumur (about 1735) also calls them "tipules." Linné quotes Frisch and probably borrows the name from him. It is not impossible that Aldrovandi's figure of *Ranatra* has been mistaken for a crane-fly (*Tipula*), by one of the subsequent authors.

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above, gave only the general classification), appeared a few months after Meigen's work. Although acquainted with Meigen's labors, Latreille does not adopt his new genera, except *Limonia*. The subdivision of Latreille's *Tipulariæ* (afterwards called *Diptera nemocera*) is rather confused, but the character derived from the length of the last joint of the palpi, which became so important soon after, is introduced here. The genera with an elongated last joint of the palpi are: *Tipula* (corresponding to the present genus *Ctenophora*), *Tanyptera* (for *Ctenophora atrata* Fabr.), and *Tychoptera* (containing species of the genus *Tipula* and *Ptychoptera*). The genera with a short last joint of the palpi are *Limonia*, *Molobrus* (Sciara), and *Oligotropha* (Cecidomyia).

In Latreille's next work—*Genera crustaceorum et Insectorum*, Vol. IV, 1809—a considerable progress is apparent. Here for the first time, the family *Tipulidæ* in our sense is distinguished as a separate tribe *Tipulariæ terricolæ*, co-ordinate to the *Tipulariæ aquaticæ* (Culex, Chironomus), *fungivoræ* and *florales*. The *Tipulariæ terricolæ*, characterized by the structure of their antennæ, the absence of ocelli and the length of their feet, are divided into two groups, according to the length of the last joint of the palpi. The group with an elongated joint is composed of the genera *Ctenophora*, *Pedicia*, *Tipula*, *Nephrotoma*, *Ptychoptera*; the group with a short joint, of *Limonia* and *Hexatoma* (now *Anisomera*). *Limonia* which, in the sense of the author, includes *Trichocera* and *Erioptera*, is further subdivided in four sections, based upon the structure of the antennæ and the venation. Among the genera *Pedicia* and *Hexatoma* are new.

The name *Diptera nemocera* has been proposed for the first time by Latreille in 1817, in the *Nouveau Dictionnaire d'Histoire naturelle*, in the articles *Diptères* and *Entomologie*.

Fabricius's principal work on Diptera, published in the mean time—*Systema Antliatorum*, 1805—did not add anything of importance to the knowledge of the distribution of the *Tipulidæ*.

In Meigen's great work—*Systematische Beschreibung der bekannten Europäischen zweiflügligen Insecten*—the first volume of which, containing the *Tipulidæ*, appeared in 1818, the *Diptera nemocera* were called *Tipulariæ* (Mücken), and subdivided in the sections: *culiciformes* (now Culicidæ and Chironomidæ),

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gallicolæ (now Cecidomyidæ), *noctuæformes* (Psychodidæ), *rostratæ* (Tipulidæ), *fungicolæ* (Mycetophilidæ), *lugubri* (genus *Sciara*), *latipennes* (Simulidæ), *muscæformes* (Bibionidæ and Rhyphidæ). The *Tipulariæ rostratæ* (our Tipulidæ) were defined thus: "Eyes rounded, separated by the front above; no ocelli; head prolonged in a snout; palpi incurved; thorax with a curved transverse suture in the middle; abdomen with eight segments; tibiæ more or less spurred." The following genera were added to those adopted in the "*Klassification*," etc.: *Rhipidia*, *Nematocera*, *Anisomera*. The name *Limonia* (from λειμών, meadow), as objectionable on account of a foreign idea which might be connected with it, was changed in *Limnobia*. *Hexatoma* Latr., was changed in *Nematocera*, rather arbitrarily, the only reason for this change being that Meigen himself wanted to use the name *Hexatoma* for one of his genera. *Limnobia* was defined in the following manner:—

"Antennæ setaceous, 15–17 jointed; first joint cylindrical, the second cyathiform, the following elongated or globular.

Palpi incurved, cylindrical, four jointed; the joints of equal length.

No ocelli.

Wings (generally) incumbent in a parallel position to each other; veins glabrous."

The definition of *Tipula* differs only in the statement about the structure and the number of joints of the antennæ (thirteen); the prolonged last joint of the palpi and the divaricate wings.

In the sixth volume of the same work (1830) the genera *Glochina*, *Rhamphidia*, *Symplecta*, and *Dolichopeza* were added. The latter genus, however, had been originally proposed by Curtis (*British Entomology*, II, 62) in 1825.

In reviewing the first steps taken in the classification of the *Tipulidæ*, we cannot but notice the contrast between the talents of Latreille and Meigen. The correct definition of all the large subdivisions, as the separation of the *Diptera nemocera*, the recognition of the *Tipulidæ* as a family, and the subdivision of this family in *longipalpi* and *brevipalpi* are due to Latreille. But the adoption of all the leading genera is the work of Meigen.

Contemporaneously with Meigen's work, Wiedemann's *Diptera Exotica* (1821) and *Aussereuropaeische Zweiflügelige Insecten*

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(1828–30) appeared. They did not introduce any change in the classification, but added two new genera to the system.: *Polymera* and *Megistocera*.

Macquart, in both of his works (*Diptères du Nord de la France*, 1825, and *Hist. Nat. des Ins. Diptères*, Vol. I, 1834), retains Latreille's designations: *Diptera nemocera* and *Tipulariæ terricolæ*. To the latter family, in the last of the two works, he adds the genus *Dixa*, placed by Meigen among the *Tip. fungicolæ*. He also follows Latreille in subdividing the *Tip. terricolæ* in the *longipalpi* (genera: *Ptychoptera, Ctenophora, Tipula, Pachyrrhina, Nephrotoma, Pedicia*) and *brevipalpi* (*Ozodicera, Rhipidia, Rhamphidia, Idioptera, Limnophila, Limnobia, Cylindrotoma, Symplecta, Erioptera, Polymera, Megistocera, Trichocera, Dolichopeza, Dixa, Anisomera, Chionea*). Among these genera *Ozodicera, Idioptera, Pachyrrhina, Limnophila*, and *Cylindrotoma* were new. *Chionea* had been described, in 1816, by Dalman, and correctly referred to the *Tipulidæ*. The principal innovation of Macquart was the introduction of the genera *Pachyrrhina* and *Limnophila*, which broke up Meigen's large genera *Tipula* and *Limnobia*.

The most important publications on the Diptera in general, since Macquart's last quoted works, are Zetterstedt's, Walker's, and Rondani's. Zetterstedt (*Fauna Lapponica*, 1840, and *Diptera Scandinaviæ*, tenth volume, 1851) introduced several new genera, but did not improve the distribution of the family of *Tipulidæ*. The subdivision into *longipalpi* and *brevipalpi* was entirely abandoned by him, and the genera belonging to these two groups were arranged promiscuously. The genus *Chionea* forms a separate family for itself, between which and the *Tipulidæ* the *Mycetophilidæ* are inserted. Zetterstedt's new genera are *Psiloconopa, Dicranota, Tricyphona*, all of which had been originally adopted in his earlier work in 1840.

Walker (*Insecta Britannica, Diptera*, Vol. III, 1856) adopts, in the main, Meigen's distribution of the *Tipulidæ*. Macquart's genera *Limnophila* and *Pachyrrhina* are introduced as subgenera only. The genera *Geranomyia* and *Ula*, originally proposed by Mr. Haliday, in 1833 (*Entomol. Magaz.* Vol. I), are introduced here, and the genus *Amalopis* is suggested by the same author in a note (*Addenda*, p. xv), but not introduced in the body of the work.

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Mr. Rondani, in his *Prodromus Dipterologiæ Italicæ*, Vol. I (1856), proposed the following distribution :—[1]

Fam. XXV. *Tipulida.*

I. Stirps *Limnobiina.*

A. Eleven or twelve longitudinal veins reach the margin.

1. *Erioptera* (type: *E. obscura* M.; therefore syn. *Molophilus*).—2. *Chemalida*, n. g. (type: *Erioptera tænionota* M.).—3. *Ilisomyia*, n. g. (type: *I. nubipennis*, n. sp.).—4. *Ilisophila*, n. g. (type: *Erioptera lutea* M.).—5. *Ormosia*, n. g. (type: *Erioptera nodulosa* Macq., which, in my distribution, would be a *Rhypholophus*).—6. *Spyloptera*, n. g. (type: *S. meridionalis*, n. sp.; also a *Rhypholophus*, according to Dr. Schiner).—7. *Limnœa*, n. g. (type: *Erioptera flavescens* Lin.).—8. *Symplecta.*—9. *Rhamphidia.*—10. *Cylindrotoma.*—11. *Taphrosa*, n. g. (syn. *Goniomyia*).—12. *Orosmya*, n. g. (type: *O. apenna*, n. sp.).—13. *Ilisia*, n. g. (type: *Erioptera maculata* M.).—14. *Elæophila*, n. g. (type: *Ephelia marmorata* Hgg.).—15. *Limnophila.*—16. *Bophrosia*, n. g. (syn. *Tricyphona*).—17. *Trichocera.*—18. *Idioptera.*—19. *Ula.*

AA. Only *ten* longitudinal veins reach the posterior margin.

20. *Dolichopeza.*—21. *Anisomera.*—22. *Nematocera.*—23. *Dixa.*—24. *Pelosia*, n. g. (type: *P. albifrons*, n. sp.).—25. *Glochina* (type: *G. sericea* M.).—26. *Taphrophila*, n. g. (type: *Dicranomyia inusta* M.).—27. *Limnomyza*, n. g. (type: *Limnobia tripunctata* M.).—28. *Limnobia* (type: *L. chorea* M.).—29. *Rhipidia.*

II. Stirps *Tipulina.*

1. *Ceroctena* (syn *Dictenidia* Brullé).—2. *Xiphura.*—3. *Ctenophora.*—4. *Ctenocera*, n. g. (type: *Ptychoptera pectinata* Macq.).—5. *Ptychoptera.*—6. *Pedicia.*—7. *Nephrotoma.*—8. *Alophroida*, n. g. (type: *A. cinerea*, n. sp.).—9. *Pachyrrhina.*—10. *Tipula.*—11. *Pterelachisus.*

Fam. XXVI. Chioneidæ.
Fam. XXVII. Orphnephilidæ.
Fam. XXVIII. Berteidæ.
Fam. XXIX. Asthenidæ.
Fam. XXX. Rhyphidæ.

It is unnecessary to enter into a detailed criticism of this

[1] I have seen Mr. Rondani's first volume only, containing the general synopsis of all the families of Diptera, and it is from this volume that the extract which I give is reproduced; I do not know whether the volume containing the *Tipulidæ* has appeared at this date or not.

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distribution, as its comparison with the one adopted in this volume can be easily effected.

As early as 1854 (*Stettiner Entomol. Z.* p. 203), I had suggested that the proper way to subdivide the genus *Limnobia* Meigen, would be, to base this subdivision on the number of the submarginal cells, instead of the posterior cells (as Macquart has done it). At the same time, I observed that a division established upon this character, would be very well supported by characters taken from the structure of the forceps of the male.

In 1859 (*Proc. Acad. Nat. Sciences Philad.* p 197) I carried out these suggestions, by applying them to the North American fauna. The distribution of the *Tipulidæ brevipalpi* into six groups, proposed by me, was based upon a combination of characters, taken from the number of submarginal cells, the number of antennal joints, the presence or absence of spurs at the tip of the tibiæ, and the position of the subcostal cross-vein. This distribution required the adoption of a considerable number of new genera.

In 1864, Dr. Schiner, in his work *Fauna Austriaca, Diptera*, adapted my distribution to the European fauna.

As the present volume contains the development of the same distribution, the necessary details about it will be given at the proper places below (compare also the § 5 of this Introduction).

In the same year, Mr. Lioy arranged the *Tipulidæ* (his family *Rostratiti*) into four subfamilies: *Paludicolini* (our Ptychopterina), *Lignicolini* (genus Ctenophora), *Terricolini* (our Tipulina), *Limnocolini* (embracing all our *Tipulidæ brevipalpi*). He proposed several genera, which I will mention in the list given below.

I conclude this review of the progress of the classification of the *Tipulidæ* with a list, in chronological order, of all the generic and subgeneric names, which have been proposed in this family, whether finally adopted or not. Further historical details about the *Tipulidæ* will be given under the heads of the different genera.

Tipula Linné, Animalia per Sueciam observ. 1736.
Trichocera Meigen, Illiger's Magaz. 1803 (Limnophilina).
Eriopter a Meig. l. c. (Eriopterina).
Limonia Meig. l. c. (changed afterwards in *Limnobia*).
Nephrotoma Meig. l. c. (Tipulina).

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Ptychoptera Meig. l. c. (Ptychopterina).
Ctenophora Meig. l. c. (Ctenophorina).
Tanyptera Latreille, Hist. Natur. des Crust. et des Insectes, Vol. XIV, 1804 (syn. *Ctenophora*).
Tychoptera Latr. l. c. (syn. *Tipula* and *Ptychoptera*).
Pedicia Latr. Genera, etc. Vol. IV, 1809 (Amalopina).
Hexatoma Latr. l. c. (syn. *Anisomera*).
Chionea Dalman, Kon. Vetensk. Akad. Handl. 1816 (Eriopterina).
Limnobia Meig. System. Beschr. Vol. I, 1818.
Nematocera Meig. l. c. (syn. *Anisomera*).
Anisomera Meig. l. c. (Anisomerina).
Rhipidia Meig. l. c. (Limnobina).
Gonomyia Megerle in Meigen, l. c. 1818 (now *Goniomyia*, Eriopterina).
Polymera Wiedemann, Dipt. Exot. 1821 (Amalopina?).
Megistocera Wied. l. c. (originally *Mekistocera*).
Helobia (syn. *Symplecta*).
Megarhina (changed afterwards in *Helius*).
Helius (syn. *Rhamphidia*).
} St. Fargeau, Encycl. Méthod. Insectes, 1825, Vol. X, p. 585 et Index.
Dolichopeza Curtis, Brit. Entomol. 62, 1825 (Tipulina).
Glochina Meig. System. Beschr. etc. 1830, Vol. VI (Limnobina).
Rhamphidia Meig. l. c. (Limnobina anomala).
Symplecta Meig. l. c. (Eriopterina).
Leptorhina Steph. Catal. Brit. Ins. 1829 (syn. *Rhamphidia* Meig.).
Dicranomyia Steph. l. c. (Limnobina).
Xiphura Brullé, Ann. Soc. Entom. de Fr. I, p. 205, 1832 (Ctenophorina).
Dictenidia Brullé, l. c. II, p. 402, 1833 (Ctenophorina).
Molophilus Curtis, British Entomology, 444, 1833 (Eriopterina).
Geranomyia Haliday, Entomol. Magaz. Vol. I, 1833 (Limnobina).
Ula Halid. l. c. (Amalopina).
Limnophila Macquart, Hist. Nat. Dipt. 1834, Vol. I.
Pachyrrhina Macq. l. c. (Tipulina).
Ozodicera Macq. l. c. (Tipulina).
Idioptera Macq. l. c. (Limnophilina).
Cylindrotoma Macq. l. c. (Cylindrotomina).
Aporosa Macq. Webb et Berthelot, Hist. Nat. des Canaries, 1835 (syn. *Geranomyia* Hal.).
Limnobiorhynchus Westw. Ann. Soc. Entom. de Fr. IV, p. 683, 1835 (Limnobina and Rhamphidina).
Caloptera Guérin in Westw. l. c. (changed afterwards in *Evanioptera*, Anisomerina).
Anoplistes Westw. Zool. Journ. V, p. 446, Tab. XXII, f. 10–13, 1835 (Limnophilina).
Gynoplistia Westw. (same as preceding; only name modified) Lond. and Edinb. Philos. Magaz. VI, p. 280, 1835.
Ptilogyna Westw. Zool. Journ. l. c. Tab. XXII, f. 14, 15; Lond. and Edinb. Phil. Mag. l. c. (Ctenophorina).

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Ozocera Westw. Zool. Journ. l. c. (changed afterwards in *Cerozodia*).
Cerozodia Westw. Lond. and Edinb. Phil. Mag. l. c. (Limnophilina).
Hemicteina Westw. Zool. Journ. l. c. (Ctenophorina, syn. *Ozodicera* Mcq.).
Bittacomorpha Westw. Lond. and Edinb. Phil. Magaz. VI, p. 281, 1835 (Ptychopterina).
Peronecera Curtis, Brit. Entomol. 589, 1836 (Anisomerina).
Evanioptera Guérin, Voy. de la Coquille, Zoologie, Texte I, 2, p. 287, Tab. XX, f. 2. The text was published in 1838; the plates, upon which the genus was called *Cuoptera*, in 1830 (Anisomerina).
Leptotarsus Guérin, l. c. (Tipulina).
Ctenogyna Macq. Diptères Exotiques, Vol. I, p. 42, 1838 (Ctenophorina).
Eriocera Macq. l. c. (Anisomerina).
Psilloconopa Zetterstedt, Ins. Lapponica, 1840 (Eriopterina).
Dicranota Zett. l. c. (Amalopina).
Tricyphona Zett. l. c. (Amalopina, syn. *Amalopis*).
Pterelachisus Rond. Guérin, Magaz. de Zool. 1842, No. 106 (Tipulina).
Prionocera Loew, Stettiner Entom. Zeitung, 1844, p. 170 (Tipulina, syn. *Stygeropis*).
Styringomyia Loew, Dipterol. Beitr. I, p. 6, 1845 (Limnobina anomala).
Apelleses Macq. l. c. 1er Supplemt. 1846 (Tipulina).
Cheilotrichia Rossi, Systemat. Verz. Oester. Zweifl. p. 12, 1848 (Eriopterina).
Pterocosmus Walker, List of the Dipt. Brit. Mus. I, p. 78, 1848 (Anisomerina).

Trichoneura, Calobamon, Haploneura, Tanymera, Tanysphyra, Ataracta, Allarithmia; Loew, *Uber d. Bernstein und die Bernstein fauna,* 1850. (These genera are named, but not described.)

Toxorrhina Loew, Linnæa Entomologica, V, p. 400, 1851 (Rhamphidina).
Macrochile Loew, l. c. p. 402 (Ptychopterina).
Chemalida, Ilisomyia, Ilisophila, Ormosia, Spyloptera, Limnæa, Ilisia (all Eriopterina); Rondani, Prodr. Dipterol. Ital. I (1856).[1]
Taphrosa (syn. *Goniomyia*), Rondani, l. c.
Orosmyia, **Pelosia** } Rondani, l. c. (location unknown to me).
Elcsophila Rondani, l. c. (syn. *Ephelia* Schin.; Limnophilina).
Taphrophila, Limnomyza, Rondani, l. c. (Limnobina).
Bophrosia Rondani, l. c. (syn. *Tricyphona*).
Ceroctena Rondani, l. c. (syn. *Dictenidia* Brullé; *Ctenophora* M.).
Ctenocerin Rondani, l. c. (Ptychopterina).

[1] All the new genera of Mr. Rondani's, mentioned by name in the first volume of his *Prodromus*, are not fully characterized; in most cases only the type of the genus is named.

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Alophroida Rondani, l. c. (Tipulina ?).
Amalopis Haliday, Walker's Ins. Brit. Dipt. III, p. xv, 1856 (Amalopina).
Oligomera Doleschall, Naturk. Tijdschr. v. Nederl. Indie, Vol. XIV, p. 11, Tab. VII, f. 3, 1857 (Anisomerina).

Dicranoptycha.	Limnobina anomala.	O. Sacken, Proc. Acad. Nat. Sc. Phila. 1859.
Antocha.		
Elephantomyia.		
Teucholabis.		
Gnophomyia.	Eriopterina.	
Cryptolabis.		
Cladura.		
Lasiomastix.	Subgenera of Limnophila.	
Epiphragma.		
Dactylolabis.		
Dicranophragma.		
Arrhenica.	Anisomerina.	
Protoplasa.	Ptychopterina.	

Physecrania Bigot, Ann. Soc. Entom. de Fr. 1859, p. 123, Tab. III, f. 1 (Anisomerina).
Bertea Rondani, Atti Soc. Ital. Sc. Natur. Milano, II, p. 56, with fig. 1860 (location uncertain).
Rhypholophus Kolenati, Wiener Entom. Monatschr. IV, with fig. 1860 (Eriopterina).
Crunobia Kolenati, l. c. (Amalopina).
Trimicra O. Sacken, Proc. Acad. Nat. Sc. Phila. 1861, p. 290 (Eriopterina).

Penthoptera (Anisomerina).	Schiner, Wiener Entom. Monatschr. Vol. VII, 1863, and Dipt. Austriaca, Vol. II, 1864.
Dasyptera (Eriopterina).	
Trichostoma (Eriopterina).	
Ephelia (Limnophilina).	
Pœcilostola (Limnophilina).	
Elliptera (Limnobina anomala).	
Triogma (Cylindrotomina).	
Phalacrocera (Cylindrotomina).	

Holorusia Loew, Berl. Entomol. Zeitschr. Vol. VII, 1863 (Tipulina).
Stygeropis Loew, l. c. (Tipulina).
Platytoma Lioy, Atti Inst. Ven. 3d series, Vol. IX, X, 1864 (Eriopterina).
Macroptera Lioy, l. c. (Amalopina, syn. *Ula*).
Anomaloptera Lioy, l. c. (Tipulina).
Dicera Lioy, l. c. (Ctenophorina).

Plettusa (Limnobina, syn. *Geranomyia*).	Philippi, Verh. Zool. Bot. Gesellsch. in Wien, 1865, p. 595 sqq. (with figures).
Ctedonia (Limnophilina).	
Polymoria (Limnophilina ?).	
Idioneura (Eriopterina, syn. *Symplecta*).	
Lachnocera (Eriopterina ?).	

Tanyderus Philippi, l. c. p. 780, Tab. XXIX, f. 57 (Ptychopterina).
Cladolipes Loew, Zeitschr. für Gesammte Naturw. 1865, p. 395 (Anisomerina).

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Discobola O. Sacken, Proc. Entomol. Soc. Phila. 1865 (Limnobina, syn. *Trochobola*).

Paratropesa (L. anomala). **Cloniophora** (Limnophilina). **Peripheroptera** (Limnobina). } Schiner, Verh. Zool. Bot. Gesellsch. in Wien. 1866.

Thaumastoptera Mik, Verh. Z. B. G., etc., 1866 (Limnobina anomala).

Macrothorax Jæn. Schr. d. Senkenb. Ges. (Tipulina).

Rhicnoptila Now. Verh. Zool. Bot. Ges. in Wien, 1867, p. 337 (Limnophilina).

Trochobola (Limnobina).
Orimarga (Limnobina anomala).
Atarba (id.).
Sigmatomera (Eriopterina).
Empeda (id.).
Mesocyphona. **Acyphona.** **Hoplolabis.** } Subgenera of Eriopterina.
Ulomorpha (Limnophilina).
Plectromyia. **Rhaphidolabis.** } Amalopina.

} Genera and subgenera adopted in the present volume.

4. *Division of the* TIPULIDÆ *into* LONGIPALPI *and* BREVIPALPI.

Some *Tipulidæ* have the last joint of the palpi much longer than the three preceding taken together, whiplash-shaped, almost reaching the fore coxæ in the living insect. Others have this last joint hardly longer, or even shorter, than the two preceding taken together, cylindrical or subcylindrical and not whiplash-shaped. If we exclude the small and anomalous groups of the *Ptychopterina* and the *Cylindrotomina*, this division of the *Tipulidæ* in *longipalpi* and *brevipalpi* will, upon examination, prove natural enough, and supported by a considerable number of subsidiary characters. Among the *brevipalpi* the genus *Pedicia* is the only one which has the last joint of the palpi rather long (nearly once and a half the length of the three preceding joints taken together), and this induced Latreille, when he established this genus, to place it among the *longipalpi*. In all other respects, the position of *Pedicia* among the *brevipalpi* is not in the least doubtful.

Besides the structure of the palpi, the following are the characters which may be used as tests for determining the relationship of doubtful forms with either of the two divisions. Some of these characters, perhaps all, may not be of universal occurrence

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in the groups in which they prevail; but their importance arises from their characterizing the great majority of the species:—

1. In the *T. longipalpi*, the auxiliary vein ends in the first longitudinal vein, being incurved towards it; beyond the humeral cross-vein there is no other cross-vein connecting the auxiliary vein with the costa or with the first longitudinal vein. In the *T. brevipalpi* the auxiliary vein, as a rule, ends in the costa, and is connected by a cross-vein with the first longitudinal vein.

2. The structure of the cells in the vicinity of the stigma is totally different in the two divisions. The first longitudinal vein in the *T. longipalpi* is usually incurved towards the second vein and attenuated in a peculiar manner before ending in it; an oblique cross-vein connects the first vein, a short distance back of the tip, with the costa; this cross-vein, together with the anterior branch of the second vein, form near the anterior margin a small, trapezoidal cell, very characteristic of the *T. longipalpi* (it is wanting, however, in *Dolichopeza* and some related species). In the *T. brevipalpi* the first longitudinal vein ends in the costa, and the cross-vein, at its tip or some distance before it, connects it with the second longitudinal vein; no structure like the trapezoidal cell is apparent.

3. The structure of the discal cell and the direction of the veins surrounding it is different in the two divisions. In the *T. longipalpi*, the vein separating the two last posterior cells (the posterior intercalary vein of Mr. Loew; compare *Monogr. of N. A. Diptera*, I, p. xxiv, fig. 3, *v*) issues very near the inner end of the discal cell, usually from the angle, between this cell and the great cross-vein; this, in most cases, gives the cell a pentagonal shape, unless, as for instance in the genus *Pachyrrhina*, the vein has no contact at all with the cell, and has the appearance of the direct prolongation of the fourth longitudinal vein; in such cases the discal cell is a parallelogram. In the *T. brevipalpi* the posterior intercalary vein issues from the latter end of the discal cell, and its origin is quite distant from the great cross-vein, which is usually near the inner end of the discal cell. The *Amalopina* show some approach to the *T. longipalpi* in the position of the intercalary vein and in the shape of the discal cell; still the origin of the intercalary vein in the *Amalopina* is usually rather distant from the great cross-vein. *Amalopis vernalis* O. S., is the only species which, in this

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respect, is like the *T. longipalpi;* the intercalary vein of this species issues from the angle between the cross-vein and the discal cell, at the inner end of the latter.

4. In the *T. longipalpi* a distinct fold generally runs across the wing from the inner end of the stigma, over the discal cell, to the penultimate posterior cell; it is usually marked by a paler coloring of the membrane of the wing and by a discoloration of the wing-veins; it is more or less distinct in the different genera. In the *T. brevipalpi* this fold is not apparent, and a slight trace of it may sometimes be observed in the partial discoloration of the veins at the inner ends of the discal and of the penultimate posterior cells.

5. The *T. longipalpi* usually keep the wings divaricate in repose, while the *T. brevipalpi* fold them over the abdomen. *Pedicia*, which reminds us of the *longipalpi* by the length of the last joint of the palpi, also keeps the wings divaricate in repose.

6. The rostrum of the *T. longipalpi* is usually more prolonged and its upper part projects in the shape of a point (*nasus*), clothed with hair; a very marked character, seldom wanting among the *T. longipalpi*, and not observed among the *T. brevipalpi*.

7. The antennæ of the normal types of *T. longipalpi* are 13-jointed; those of the *T. brevipalpi* are from 14 to 16-jointed; exceptions are comparatively rare. The structure of the joints of the flagellum, common among the *T. longipalpi*, is different from that of the majority of the *T. brevipalpi*.

8. The male genitals of the *T. longipalpi* are of a more complicated structure and more voluminous than the simple forceps of the *T. brevipalpi;* still, in this respect, intermediate forms occur.

9. The size of the *T. longipalpi* is generally considerably larger; their feet and especially the tarsi, are longer.

The *Ptychopterina*, as I have said above, are an anomalous group, which does not well fit in either of the two principal divisions of the *Tipulidæ*. Their palpi are long; but this length depends on the elongation of all the joints and not of the last joint in particular; this applies especially to the genera *Protoplasa* O. S. and *Tanyderus* Philippi. The auxiliary vein in *Bittacomorpha* and *Ptychoptera* ends in the costa, and there is no cross-vein connecting it with the first longitudinal vein; in

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Protoplasa and *Tanyderus*, this cross-vein exists, and its position is altogether as in the *T. brevipalpi*. The rest of the venation of the *Ptychopterina* is peculiar and distinguished by the absence of the sixth longitudinal vein; still this venation is more like that of some *T. brevipalpi*, than of any *T. longipalpi;* there is hardly any vestige of a fold across the wing. The general appearance and the coloring of the body and of the wings are much more like the *T. brevipalpi;* the structure of the antennæ and the number of their joints also remind us of them. The elongated epistoma, however, in *Bittacomorpha* and *Ptychoptera*, shows something of the *nasus* peculiar to the *T. longipalpi;* it is not apparent in *Protoplasa*. The *Ptychopterina* keep the wings divaricate in repose (I do not know whether this applies equally to *Protoplasa*).

In the *Cylindrotomina*, the course of the auxiliary and first longitudinal veins strongly remind us of the *T. longipalpi;* the *T. brevipalpi* with a single submarginal cell, as far as known, never have spurs at the tip of the tibiæ, whereas the *Cylindrotomina* partake of both of these characters at the same time; the *T. brevipalpi* with a single submarginal cell always have only four posterior cells, *Cylindrotoma distinctissima* and *C. americana* have a single submarginal cell and five posterior cells. At the same time, the number of the antennal joints of the *Cylindrotomina* (16), the position of the posterior intercalary vein and the structure of the palpi, are characters belonging to the *T. brevipalpi*. The *Cylindrotomina*, except in the above quoted instance, have four posterior cells, a character of common occurrence among the *T. brevipalpi*, and, as far as I know, not observed yet among the *T. longipalpi*. (Compare, for more detail, the chapter on the *Cylindrotomina*.)

Thus, if we adopt the division into *T. longipalpi* and *T. brevipalpi*, it will be necessary to form a third group which will be artificial and contain the intermediate and anomalous forms.[1]

[1] It was with this intention that I introduced in the first volume of the present series (*Monographs*, etc., Vol. I, p. 11) the group *Ptychopterina*, coordinate with the *T. longipalpi* and *brevipalpi* (following Mr. Loew's precedence, I then called them *Tipulina* and *Limnobina*). With the *Cylindrotomina* I was hardly acquainted at that time, as I had found on this continent only a single doubtful specimen. It may not be amiss to notice here, that the two last lines of the above quoted page contain a *lapsus calami*, which

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But as the *Tipulidæ* are divided now into a larger number of natural groups or sections, the subdivision into *T. longipalpi* and *brevipalpi* has lost somewhat of its importance. These names are, nevertheless, very convenient terms for designating the two large groups of which the family is composed; and they are the more convenient in the present publication, as the two parts of which it is intended to consist will nearly coincide with these groups.

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5. *Distribution of the* TIPULIDÆ BREVIPALPI *in sections.*

The bulk of the *T. brevipalpi* is represented in the genus *Limnobia* Meigen, which contains the most heterogeneous elements. Several attempts have been made to subdivide it into sections, or to break it up altogether; but strange enough, all these attempts were based upon secondary characters, whereas the number of submarginal cells was either entirely overlooked, or applied to the distinction of subordinate groups only. Thus, both Zetterstedt (*Dipt. Scand.* X, 1851) and Walker (*Ins. Brit., Diptera*, III, 1856) use for their primary subdivision of *Limnobia*, the presence or absence of the discal cell; and next to this, the number of posterior cells. The consequence is, that one of Prof. Zetterstedt's ultimate subdivisions contains the following species in the same order as they are given here: *L. didyma* M. (a *Dicranomyia;* section *Limnobina;* one submarginal cell); *L. pilipes* F. (*Trimicra;* section *Eriopterina;* two submarginal cells); *L. replicata* L. (*Phalacrocera;* section *Cylindrotomina*); *L. trisulcata* Schum. (*Triogma;* section *Cylindrotomina*); *L. tristis* Schum. (*Dicranomyia;* one submarginal cell); *L. fuscescens* Schum. (*Dicranoptycha;* section *Limnobina anomala;* one submarginal cell); *L. murina* Zett. and *hyalinata* Zett. (probably *Dicranomyiæ;* one submarginal cell); *L. pilicornis* Zett. (probably *Ulomorpha;* section *Limnophilina;* two submarginal cells); *L. pilosa* Schum. (*Ula;* section *Amalopina;* two submarginal cells); *L. ciliaris* Schum. (*Erioptera;* two submarginal cells); *L. lugubris* Zett. (perhaps a *Psiloconopa?* section *Eriopterina;* two submarginal cells); *L. morio* F. (*Dicrano-*

requires correction; in the penultimate line, read *first* instead of *second;* in the last line read *auxiliary*, instead of *first longitudinal.*

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myia; one submarginal cell); *L. gracilis* Zett. (probably *Goniomyia;* section *Eriopterina;* two submarginal cells). Among fourteen species, six different sections of the *Tipulidæ* and at least ten genera are represented!

Earlier than Zetterstedt and Walker, Macquart had divided *Limnobia* Meig. in two genera: *Limnobia*, with four posterior cells, and *Limnophila*, with five. If Mr. Zetterstedt did not seem to attach any importance to the number of submarginal cells, except as a specific distinction, Macquart is somewhat in advance of this author; he uses this character, but without recognizing yet its full importance. His genus *Limnobia* is subdivided into two groups, the first of which, with a single submarginal cell, answers to our genera *Dicranomyia* and *Limnobia;* the second, with two submarginal cells, contains the species: *L. sylvatica* M. (a *Limnophila*, with four posterior cells); *L. platyptera* Macq. (the same); *L. diana* Macq. (an *Eriocera*), etc.

The presence or absence of a discal cell is, in most cases, a character of a very secondary value, often unreliable even for the distinction of species The presence of a fifth posterior cell is not always indicative of a corresponding modification in the other organs. Closely allied species, in the genera *Eriocera* and *Penthoptera* for instance, have a different number of posterior cells. The number of submarginal cells is a character of a much higher value, and can be applied with advantage to the whole group of *Tipulidæ brevipalpi*, and not to the genus *Limnobia* Meigen, only. But, used alone, it does not overcome the principal difficulty, which consists in eliminating from the genus *Limnobia*, in Meigen's sense, all the foreign elements which it contains. In order to attain this end, we have to use several other characters. In the *Proc. Acad. Nat. Sciences of Philadelphia*, 1859, I have proposed a distribution, based upon the number of submarginal cells, the presence or absence of spurs at the tip of the tibiæ, the presence or absence of empodia, the structure of the ungues, the number of antennal joints, and the position of the subcostal cross-vein. The scheme of this distribution, which is retained in the present volume, is the following:—[1]

[1] Instead of the names ending in *formes*, which I applied to the sections in 1859 (*Limnobiæformes*, *Eriopteræformes*, etc.), I adopt here the more convenient termination in *ina*. The name of the sixth section, *Pediciæformia*, is changed in *Amalopina*.

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I. A single submarginal cell.

Antennæ 14-jointed.	Antennæ 16-jointed.
Sect. I. **Limnobina.**	Sect. II. **Limnobina anomala.**

II. Two submarginal cells.

No spurs at the tip of the tibiæ.	Tibiæ with spurs.
Sect. III. **Eriopterina.**	

Auxiliary cross-vein posterior to the origin of the second vein.	Auxiliary cross-vein anterior to the origin of the second vein.

Antennæ 16-jointed. Sect. IV. **Limnophilina.** Antennæ 6 or 10-jointed. Sect. V. **Anisomerina.** Sect. VI. **Amalopina.**

Besides the leading characters, mentioned in the table, almost all the sections have some other characters peculiar to them, as may be seen in the following definitions:—

I. **Limnobina.** One submarginal cell; four posterior cells. Normal number of antennal joints[1] *fourteen* (sometimes apparently 15). Eyes glabrous. Tibiæ without spurs at the tip; ungues with more or less distinct teeth on the under side; empodia indistinct or none.

II. **Limnobina anomala** (artificial group). One submarginal cell (none in *Toxorrhina*). Normal number of antennal joints *sixteen*.

III. **Eriopterina.** Two submarginal cells; four posterior cells (five cells in *Cladura* only); discal cell sometimes closed, but very often open. Normal number of antennal joints *sixteen*. Eyes glabrous. Tibiæ without spurs at the tip; empodia distinct; ungues smooth on the under side.

IV. **Limnophilina.** Two submarginal cells; usually five, seldom four posterior cells; discal cell generally present; subcostal cross-vein posterior to the origin of the second longitudinal vein, usually closely approximated to the tip of the auxiliary vein (considerably distant in *Trichocera* only). Eyes glabrous (pubescent in *Trichocera*). Normal number of antennal joints *sixteen*. Tibiæ with spurs at the tip; empodia distinct; ungues smooth.

V. **Anisomerina.** Two submarginal cells (only one in *Cladolipes*); three, four, or five posterior cells; discal cell closed or open; subcostal

[1] Each one of the sections has a number of antennal joints, which is the *normal* number of this section. If a genus or species belonging to it have a smaller number, it can usually be shown that this number is due to the coalescence of some joints. This is for instance the case with *Elephantomyia* and *Toxorrhina* (compare these genera). Occasionally a larger number of joints is met with, as in the genus *Nephrotoma*, among the *Tipulidæ longipalpi*; or among some foreign genera of *Limnophilina*; but these are exceptions.

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cross-vein near the tip of the auxiliary vein, posterior to the origin of the second vein. Eyes glabrous. The normal number of the antennal joints is *six* in the male and not more than *ten* in the female. Tibiæ with spurs at the tip; empodia distinct; ungues generally smooth.

VI. **Amalopina.** Two submarginal cells; discal cell closed or open; subcostal cross-vein far removed from the tip of the auxiliary vein, anterior to the origin of the second longitudinal vein. Tibiæ with spurs at the tip; empodia distinct. Eyes pubescent; front usually with a more or less distinct gibbosity. Normal number of antennal joints *sixteen* (seldom 17), or *thirteen*.

The second of these groups is called artificial, because it is destined to receive all the genera with a single submarginal cell which, at the same time, have sixteen-jointed antennæ. All such genera are so very peculiar in their characters, that it is natural enough to isolate them from the first section; but with all that, most of these genera do not show any relationship to each other and their juxtaposition is therefore artificial. The connecting links between them may not have been yet discovered, or they may have been lost in the course of geological ages; nevertheless, the adoption of this artificial group will be found of great advantage in the system. If it should be proved that one of these genera is related to some genus of another section, it will have to be removed to that section. Thus, in the genus *Cladolipes* Loew, closely related to *Anisomera*, one of the branches of the second vein has disappeared, and hence the genus has only a single submarginal cell. Nevertheless, as the natural relationship of this genus is evident, we place it among the genera with two submarginal cells. The aim of all classification is to increase our knowledge of the structure of organic beings by illustrating their natural relationship. If the natural relationship of some organic form be obscure, we may, for the sake of convenience, locate it provisionally on account of some artificial character; but this provisional state has to cease, as soon as the true relationship is found out. In this sense, the location of several of the genera of the second group may be only provisional and connecting links between them and the other sections may yet be discovered.

The other sections, as far as known, have very well marked

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limits, and there are but very few forms of transition from the one to the other.

The *Eriopterina*, through the entire disappearance of the short anterior branch of the second vein in *Goniomyia*, may show a leaning towards the group of *Limnobina anomala;* on the other side, some genera of *Eriopterina* may come very near those *Limnophilina* which, with only four posterior cells, combine exceedingly small, almost obsolete, spurs at the tip of the tibiæ. These connections are as yet very obscure, and we have to wait for further discoveries. Another question which may be naturally raised here is, whether *Cladura*, which alone among the *Eriopterina* has five posterior cells, is not rather to be considered as a genus of *Limnophilina*, the tibial spurs of which have become obsolete. A more detailed study of the organization of *Cladura* will have to show on which side its relationship is the strongest. The *Anisomerina*, especially the genus *Eriocera*, are closely related to the *Limnophilina;* but the number of antennal joints establishes a distinct limit between the two sections. Intermediate forms are, as yet, unknown, although they may be in existence. *Trichocera*, the only genus among the *Limnophilina*, which has pubescent eyes and the subcostal cross-vein far remote from the tip of the auxiliary vein, shows, in this respect, a leaning towards the *Amalopina;* in other respects, however, its relationship to the *Limnophilina* is manifestly stronger.

The more characters peculiar to each one of the sections we accumulate, the stronger we render the basis upon which the classification is established and easier the solution we prepare for all future doubtful cases. In this respect, a great deal yet remains to be done. The progress of this study depends very much on the observation of fresh specimens, and these cannot always be had when wanted. Thus very good characters may be derived from the comparison of the size and structure of the different parts of the thorax and of the abdomen; especially of the segments of the latter preceding the forceps. But these parts are subject to shrinkage in drying, and in this state it is easy to take an erroneous view of them. It is for this reason that I have abstained from entering upon their detailed description. The structure of the other soft parts of the body, as the palpi, the

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forceps, and in many cases the antennæ, has been noted down by me, almost invariably from living or fresh specimens.

At the end of the *Tipulidæ brevipalpi* I place the two sections which I consider as intermediate between them and the *T. longipalpi* (compare above, p. 19): the *Cylindrotomina* and *Ptychopterina*:—

Sect. VII. **Cylindrotomina.** One submarginal cell; first longitudinal vein incurved at the tip towards the second, instead of ending in the costa (exception: *Phalacrocera replicata* Lin., where the first vein takes the usual course); four or five posterior cells; a discal cell; the auxiliary vein is abruptly interrupted before the stigma, without ending either in the costa, or in the first longitudinal vein. Eyes glabrous. Normal number of antennal joints sixteen. Tibiæ with spurs at the tip. Empodia distinct. Structure of the forceps and the ovipositor peculiar and characteristic.

Sect. VIII. **Ptychopterina.** Only a single longitudinal vein posterior to the fifth vein; two submarginal cells. Labium largely developed; palpi long. Tibiæ with spurs at the tip.

After having given an account of the distribution into sections, I have to add a few words on the genera. I am opposed to a too great multiplication of the genera, and I believe that as the contrast between large and small groups exists in nature, it should also be brought before the eye in the classification. In the genus *Erioptera*, for instance, the relationship of the groups which compose it is a much more striking feature than the characters which separate these groups. If we set up the groups as genera, with only three or four species in each, the difference between the large group, now called *Erioptera*, and smaller groups, such for instance as the genera *Gnophomyia*, *Trimicra*, and all the genera of the group *Limnobina anomala*, this difference, so strongly marked in nature, would remain unexpressed in the system. Subdivisions of the larger genera should of course be carefully marked, but less strongly than the intervals between the small genera, and in such cases a subgeneric subdivision may be useful. This is the course which I have followed.

6. *General remarks on the structure of the* TIPULIDÆ BREVIPALPI.

In this paragraph I do not intend to undertake a general comparative description of the external structure of the *Tip. brevi-*

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palpi. My purpose is, to give a review of those characters only, which have been used in the classification, and to furnish some explanations necessary for the better understanding of the present monograph.

The organs of the mouth of the *Tip. brevipalpi* afford comparatively few characters for the classification. The prolongation of the head in front, called the *rostrum* (compare *Monographs*, etc., Vol. I, p. xiii) is generally shorter here than in the *Tip. longipalpi;* it is considerably prolonged in the genera *Rhamphidia, Toxorrhina*, and *Elephantomyia*, and then bears the palpi at its tip. The outer envelope of the rostrum has sometimes the shape of a short tube ripped open on the under side; often, however, it is hardly tubular at all, but has rather the appearance of a labrum, and is either short and stout, or long, narrow, and linear (*Geranomyia*). Whenever I wanted to designate this outer envelope of the rostrum separately, as an independent organ, I have called it *epistoma*. The *proboscis* consists chiefly of the under lip, with its suctorial flabs; it projects more or less beyond the epistoma; the flabs are usually somewhat pubescent, linear in the *Limnobina*, more stout and fleshy in the *Limnophilina, Amalopina*, etc.; (in *Geranomyia* the under lip is very much prolonged and bilobed, the lobes being likewise long and linear). The palpi incurved backwards, when at rest, are four-jointed; a fifth joint, sometimes perceptible at their basis, probably represents a rudimental maxilla; Mr. Westwood (*Introd.* etc. II, p. 525), who makes this suggestion, adds, that the texture of this fifth joint is different from that of the other four. The last joint of the palpi is usually longer than the preceding, somewhat linear; but, except in some rare cases, as in *Pedicia*, it is never very long. Immediately under the part which I call the epistoma, is a linear, pointed organ, called the *tongue;* it is especially long in *Geranomyia*. Meigen (Vol. VI, p. 281), in dissecting the mouth of *Glochina*, also mentions a pair of horny, linear, pointed *maxillæ*. A comparative study of the parts of the mouth of the *Tipulidæ* is yet to be made.

The eyes are oblong or rounded, separated above by a front which is more or less broad in different genera, but not perceptibly broader in one sex than in the other. On the under side of the head, the eyes are usually more approximate, often almost contiguous. There is no striking difference in the size of the

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facets of the upper and of the lower part of the eyes, nor a distinct dividing line between them.[1] The eyes are glabrous, except in the *Amalopina* and in the genus *Trichocera*, where they are pubescent. Ocelli are wanting, except in *Trichocera*, where they are distinctly perceptible; *Pedicia* also shows some traces of them.

The antennæ are composed of a cylindrical, elongated first joint; a short, cyathiform or rounded second joint, and from 12 to 14 joints of the flagellum. The *Anisomerina* have an abnormal number of joints (from 6 to 10); and in some foreign genera, the number of the joints is larger (compare *Gynoplistia*, *Cerozodia*, *Cledonia*, etc.). The usual measure of the antennæ is, that when bent backwards, they nearly reach the root of the wings; they are much shorter than this in the genus *Amalopis*. The male sex in the *Anisomerina*, especially in some American species of *Eriocera*, has enormously prolonged filiform antennæ; sometimes three or four times the length of the body. Some *Limnophilæ*, also *Cylindrotoma*, have the antennæ of the male considerably longer than those of the female and pubescent on their whole length; usually, however, this difference in length between the sexes is much less perceptible. The male has often, on the under side of the three or four basal joints of the flagellum, a dense, short pubescence, which is much less perceptible in the female; in some cases this pubescence extends on both sides of the whole antenna. It is worthy of notice that when the antennæ of the male are long and pubescent, the first basal joint is very apt to be shorter than usual; this is the case for instance with *Limnophila tenuipes*, *Cylindrotoma americana*, *Ula*, etc. Pectinate antennæ occur only in *Rhipidia* among the native species, but several foreign *Limnophilina* have them also.

The feet are long and slender, more or less pubescent; the presence or absence of spurs at the tip of the tibiæ, of empodia, and of teeth on the under side of the ungues constitute the basis of the principal subdivisions of the *T. brevipalpi*, and will be sufficiently noticed below. The spurs, whenever present, are two

[1] In the genus *Blepharocera* (fam. *Blepharoceridæ*, *Monogr.* Vol. I, p. 8) the eyes are divided in two portions, the upper one with large, the lower one with small facets; the upper portion is comparatively smaller in the male than in the female; in life, these portions differ in their color; the upper one, in *B. capitata* Lw., is reddish-green, the lower one purple.

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in number on each tibia, and occur on all the three pairs of tibiæ; I have not observed a single case of spurs occurring on one or two pairs of tibiæ only.[1] The last tarsal joints show a sexual character, the very general occurrence of which has, I believe, not been observed before: in the male, the interval between the last and the penultimate joint is excised on the under side, which enables this joint to be bent under the preceding (a similar structure in a *Tipula* is figured by Westwood in Walker's *Ins. Brit. Dipt.* Tab. XXVIII, fig. 5 *d*). In such cases the last joint itself is modified in its structure, generally more elongated, slender, somewhat curved, and beset with bristles on the under side. This structure prevails through nearly all the genera, although it is sometimes wanting in single species of a genus in which it otherwise prevails.

The prothorax (collare) varies in breadth and the remaining parts of the thorax in shape. These modifications, although mentioned in the descriptions, have not served to establish any important subdivisions. On the front part of the mesonotum there is often a pair of black dots, one on each side, immediately back of the humerus; sometimes they assume the appearance of small pits, with a brown or black, shining bottom. I do not know what they are; they may have some connection with the prothoracic spiracle, which is not far from them, immediately below. There is no vestige of them in some species and genera (for instance in *Pedicia* and *Amalopis*). In other cases, they are quite conspicuous, as in the group of *Limnophilæ*, represented by *L. luteipennis*. These latter species have, besides the pits, two closely approximated shining dots, black or brown, near the point of contact of the intermediate thoracic stripe with the collare.

The abdomen is nine-jointed; the eighth joint is often narrow; the ninth usually consists of an upper half segment and of the genitals. The external sexual apparatus of the male consists of a forceps, by means of which the end of the female abdomen is seized from below, a little before the ovipositor, in such a manner, that the latter organ is stretched out on the upper part of the abdomen of the male. This done, the male with a second, inner, clutching apparatus seizes the orifice of the inner genital

[1] *Atarba* may, perhaps, form an exception; compare this genus.

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organs of the female and adjusts thereon for copulation. The structure of this outer forceps offers many modifications and is for this reason very useful in the classification.

The usual structure of the outer forceps is, that it consists of two, generally subcylindrical basal pieces, to each of which two elongated, pointed, movable appendages are fastened (compare Tab. IV, f. 23, 24, 25, 29). The two pairs of these appendages are not of the same consistency, the outer one being generally horny, the inner one often of a less hard texture. The modifications, however, of this primitive type are numerous. Sometimes the two appendages on the same side are soldered together, so as to represent a kind of horny hook (Tab. III, fig. 6, 7; Tab. IV, fig. 11, 16). In the genus *Dicranomyia* the forceps is represented by a pair of movable fleshy lobes, with horny, beak-shaped projections on the inside (Tab. III, fig. 3, 5). Among the *Eriopterina* the structure of the forceps is often complicated and subject to considerable modifications (T. IV, f. 14, 15, 17–20). The outer forceps. as far as I have been able to observe, is put in motion by a kind of horny frame, fastened to its basis on the inside and communicating with the proper muscles; this frame expands and contracts by means of a hinge in its middle (compare Tab. IV, fig. 29, and 29 *a*, the forceps of *Eriocera spinosa* and the explanation, appended to the figure; I have observed a somewhat similar structure in *Dicranoptycha sobrina*). This inner frame is also connected with the inner clutching apparatus, the structure of which has not been used, however, for descriptive purposes. Among the *Limnobina*, a single, immovable, styliform organ is visible immediately below the forceps; I have called it the *style;* this organ is not perceptible in most of the other sections. It is replaced, however, by a slender, horny, often curved and pointed piece, which is entirely concealed when the forceps is closed, and projected when it is open; I have called it *aculeus*. Among the *Cylindrotomina*, the aculeus has the shape of a lamel, more or less trifid at the tip. (For more details on the structure of the forceps, compare the explanation of Plates III and IV.) A more detailed study of the structure of the male genitals and also of the shape of the abdominal segments immediately preceding the forceps, would undoubtedly afford very valuable characters for the discovery of links of relationship otherwise

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latent. But this study is difficult, because it can give positive results only when pursued upon fresh specimens.

The female ovipositor consists of two pairs of horny valves, usually attenuated and pointed at the tip. Their length and shape afford occasionally useful characters.

The most important and at the same time the most tangible of all the characters used for the classification of the *Tipulidæ* are afforded by the wings and their venation.[1] The shape of the wings, their breadth in comparison to their length, the shape of their anal angle, etc., deserve to be noted. Their membrane, when examined under a strong magnifying power, will always appear pubescent (the wing of *Antocha* appeared pubescent under a power of 150); nevertheless in describing a wing, we call it glabrous, when the pubescence is not discernible to the naked eye nor to a lens of low power, and however indefinite the limit between a pubescent and a glabrous wing, in our sense, may seem, the practical application of these terms is hardly ever doubtful. In the same way, the wing-veins are always pubescent; but we call them so only when the pubescence is long enough to be striking under an ordinary entomological lens; otherwise we consider them as glabrous.

The terminology of the venation used by me is, in the main, that of Mr. Loew, as explained in the first volume of these *Monographs* (pp. xv–xxiv). In some respects, however, it had to be modified, in order to be rendered applicable to the *Tipulidæ*. The principal difficulty lies in the name to be given to what I will call below the *great cross-vein* and to the portion of the fifth longitudinal vein, beyond this cross-vein. If the diagram below is compared to the three diagrams given on page xxiv of the first volume of the *Monographs*, it will be easily perceived that the portion of the fifth vein, lying beyond the cross-vein in the *Tipulidæ*, corresponds to the *posterior basal transverse vein* of the wing of *Ortalis* (*Monogr.* I, p. xxiv, fig. 1, q). The *great cross-vein* of the *Tipulidæ*, if traced back to the wing of *Ortalis*, would be found to form a part of the fifth longitudinal vein (l. c. fig. 1, g g g). The course of the fifth longitudinal vein of *Ortalis*, if traced out upon the wing of a Tipulid, would be found to run along the great

[1] The term *venation*, used by English authors, is certainly preferable to *neuration*, which has been used in the first volumes of these *Monographs*.

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cross-vein, then along the discal cell, between the two intercalary veins, to the posterior margin (see l. c. fig. 3, the wing of *Empis*, which in this respect resembles that of the *Tipulidæ*, and compare it to the wing of *Ortalis* and to the diagram which I give below). Thus, if we force upon the *Tipulidæ* the terminology introduced originally for the families of Diptera with a less developed venation, we meet with inextricable difficulties. But there is no more reason for doing this than for following the opposite course, adopting a terminology for the *Tipulidæ* first and forcing it afterwards upon the *Muscidæ*. It is perfectly arbitrary at which end of the system of Diptera we begin to trace out the homologies of the venation. This study of the homologies has two distinct aims in view: the scientific aim of showing that the ground-plan of the venation is the same in all the families of the order; and the practical aim of adopting a terminology for descriptive purposes. We cannot carry out a terminology on solely theoretical grounds; we will have to vary the details of it according to the peculiarities of structure occurring in different families, the main plan remaining the same. This is done in all the departments of zoology, and I do not see why the venation of the Diptera should be treated differently.

In accordance with these views, I call *fifth longitudinal vein* the whole vein immediately following the second basal cell and the last of the posterior cells; I call *great cross-vein* (in contradistinction from the *posterior cross-vein* of the *Muscidæ*) the cross-vein connecting the fifth vein with the vein preceding it. The *fourth* vein, I look upon as including the discal cell between its two main branches.[1] The posterior of these branches is almost always forked (the posterior branch of this fork corresponds to Mr. Loew's *posterior intercalary* vein, *v*, in the wing of *Empis*, *Monogr.* I, p. xxiv, fig. 3); and the cross-vein, connecting this fork with the anterior branch, closes the discal cell; hence, when the discal cell is open, through the disappearance of this cross-vein it coalesces with the *second* posterior cell (as in Tab. I, fig. 1), or with the *third*, when there are five posterior cells (as in Tab. II, fig. 17). Such is the case with the majority of the genera which have the discal cell open, as *Orimarga*, *Empeda*, *Cryptolabis*, *Erioptera* (subgenera: *Erioptera* and *Molophilus*), *Plec-*

[1] In this I follow Dr. Schiner's views.

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tromyia, *Dicranota*, and *Rhaphidolabis*. In those genera where the discal cell is open in some species only, or in some specimens of certain species, the same rule prevails; it coalesces with the *second* posterior cell, when there are four such cells, and with the third, when there are five (compare the genus *Dicranomyia*). Cases, where the anterior branch of the fourth vein is forked and the posterior not; in other words, where, with four posterior cells, the discal cell coalesces with the *third* posterior cell (as in Tab. I, fig. 15); such cases are rare, and occur more commonly only in the section *Eriopterina* (compare the general remarks on this section); outside of it, the genera *Thaumastoptera* and *Elliptera* (Tab. I, fig. 10) only possess this character. In *Dicranomyia pubipennis* O. S., also, when the discal cell is open, it coalesces with the third posterior cell; a singular exception from among all the *Dicranomyiæ*. Outside of the *Tipulidæ brevipalpi*, this structure may be observed in *Ptychoptera* (Tab. II, fig. 19). The occurrence of five posterior cells, without any fork on the posterior branch of the fourth vein, can take place only when the anterior branch of this vein has a double fork. This is the case with *Dolichopeza;* but I have not met with any instance of this kind among the *Tipulidæ brevipalpi*, except in the *Limnophilina*. It is worthy of notice, that in this section where the discal cell is, as a rule, always closed, whenever an abnormal specimen is met with, where this cell is open, the branching of the fourth vein is very apt to appear like that of *Dolichopeza*.

The fork of the anterior branch of the fourth vein is formed by the insertion of the vein which Mr. Loew calls the *anterior intercalary vein* (*u* in *Monogr.* I, p. xxiv, fig. 3). It is the addition of this vein which raises the number of posterior cells to five.

The small cross-vein usually forms the inner end of the first posterior cell. In some rare cases the inner end of the submarginal cell is in immediate contact with the discal cell (as in the wing of *Triogma*, Tab. I, fig. 7), and in such cases there is, of course, no small cross-vein. This structure characterizes the genera *Triogma* and *Paratropeza* Schiner; it also occurs in most specimens of the North American *Cylindrotoma nodicornis* and adventitiously in the genus *Rhamphidia*.

I call *præfurca* (a term which has been used by Mr. Haliday in Walker's *Ins. Brit. Dipt.* III, p. 304) the portion of the second

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vein between its origin and the emission of the third longitudinal vein. The *petiole* of the first submarginal cell is the portion of the second longitudinal vein between the tip of the præfurca and the inner end of that cell. In order to describe the relative position of the tips of the veins and of cross-veins, I have used the term *opposite;* two points are opposite each other when, projected on the longitudinal axis of the wing, they appear equidistant from its basis. The following diagram explains the other terms, which have been used by me:—

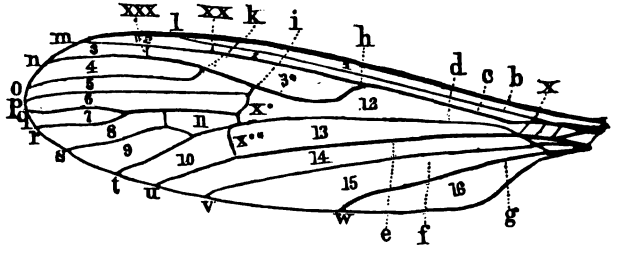

Diagram of a wing with two submarginal and five posterior cells (Cladura indivisa).

Cells.

1. Costal.
2. Subcostal.
3. Marginal.
3*. Inner marginal.
4. First submarginal.[1]
5. Second submarginal.
6–10. First to fifth posterior.
11. Discal.
12. First basal.
13. Second basal.
14. Anal.
15. Axillary.
16. Spurious.

Veins.

b l. Auxiliary.
c m. First longitudinal.
h n o. Second longitudinal.
h i. Præfurca.
k n. Anterior branch of the second l. vein.
k o. Posterior branch of the second l. vein.
i k. Petiole of the first submarginal cell.
i p. Third longitudinal.
d q r s t. Fourth longitudinal.
q r. Fork of its anterior branch; the posterior branch of this fork, ending in r, is Mr. Loew's *anterior intercalary vein.*
s t. Fork of the posterior branch of the fourth vein; the branch of this fork, ending in *t*, is Mr. Loew's *posterior intercalary vein.*
e u. Fifth longitudinal.
f v. Sixth longitudinal.
g w. Seventh longitudinal.

[1] In my paper: Description of some new Genera and Species of North American Limnobina, *Proc. Phil. Entom. Soc.* 1865, p. 225, I have called this cell the *second marginal;* the proper term, however, in accordance with the terminology originally adopted by Macquart, is *first submarginal.*

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Cross-veins.

x. Humeral.
xx. Subcostal.
xxx. Marginal.
*x**. Small, or anterior cross-vein.
*x***. Great cross-vein.

Other terms which have been used.

When the veins between the end of the præfurca (*i*) and the great cross-vein are more or less in a line, I designate them by the collective term *central cross-veins*.

Veins or cross-veins not found in the ordinary venation and therefore not separately named, have been called *supernumerary*, when they are of constant occurrence and distinguish a genus or a species; *adventitious*, when their occurrence is accidental in abnormal specimens only.

7. *Comparison of the North American and of the European* TIPULIDÆ *of the eight sections described in this volume.*

The knowledge of both faunas is far from perfect, and in this country, as well as in Europe, almost every year brings with it the discovery of some of the more rare and more interesting forms. Only the general features of these faunas can therefore be compared with a certain degree of confidence, and our statements with regard to the details, the numerical proportions of the species, and the comparison of the smaller genera must, in a certain measure, be considered as only provisional.

What strikes us most, when we compare the number of European and North American species in the eight sections of the *Tipulidæ* described in the present volume, is the remarkable agreement, in this respect, between the two faunas. The comparison of the number of species occurring in Germany (according to Dr. Schiner's enumeration), with those of the Atlantic slope of this continent (as far as represented in my collection) stands thus:—

Large Groups.	N. Am.	Germ.	Small Groups.	N. Am.	Germ.
Limnobina . . .	35	31	Limnobina anomala	10	5
Eriopterina . . .	35	34	Anisomerina . . .	6	5
Limnophilina . .	34	35	Amalopina . . .	13	14
			Cylindrotomina . .	4	4
			Ptychopterina . .	3	5
Total . . .	104 species.	100 species.	Total . . .	36 species.	33 species.

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Sum total of the eight first sections of the *Tipulidæ* (that is, the *T. brevipalpi*, including the *Cylindrotomina* and *Ptychopterina*) for North America 140, for Germany 133 species. The number of species described in Zetterstedt's *Diptera Scandinaviæ*, embracing Sweden, Norway, Denmark, and Finland, is nearly equal to the total for Germany.

The total number of the species of *T. brevipalpi* in Europe, according to Schiner's *Catalogus Dipterorum Europæ*, is 240, but a proper synonymy would very considerably reduce this number.

The striking features of the above given table are: 1. That each of the three large groups is represented by nearly the same number of species in both countries; 2. That the number of species in each of the three large groups is nearly equal to the number of species of the other two large groups, and nearly equal to the number of species in the five small groups taken together; in other words, that both in North America and in Germany, the number of species in each of the large groups is about one-quarter of the whole number; 3. That the number of species of the small groups is somewhat larger in North America than in Germany. If we extend this comparison to the genera, we will find that the large genera are represented by nearly the same number of species in North America and in Germany (*Dicranomyia* 19 and 15, *Limnobia* 9 and 12, *Erioptera* 15 and 15, *Rhypholophus* 7 and 6, *Limnophila* 27 and 29).

Among the smaller genera, some are common to North America and to Europe (we need not confine ourselves to the German fauna here), and others peculiar, as far as known, to one of the two continents.

The N. A. genera peculiar to the American continent are:—

Elephantomyia (1 sp.), *Toxorrhina* (2 sp.), *Teucholabis* (1 sp.), *Eriocera* (4 sp.), *Cladura* (2 sp.), *Atarba* (1 sp.), *Cryptolabis* (1 sp.), *Plectromyia* (1 sp.), *Rhaphidolabis* (2 sp.), *Bittacomorpha* (1 sp.), *Protoplasa* (1 sp.). *Gnophomyia* (2 sp.) is represented in Europe by *Psiloconopa* (3 or more species).

The following genera have been found as yet only in Europe:—

Elliptera (2 sp.), *Orimarga* (2 or 3 sp.), *Thaumastoptera* (1 sp.), and *Cladolipes* (1 sp.).

Common to both continents are: *Geranomyia* (2 Eur., 3 N. Am. sp.); *Trochobola* (2 Eur., 1 N. Am. sp.); *Rhipidia* (2 Eur.,

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3 N. Am. sp.); *Rhamphidia* (2 Eur., 1 N. Am. sp.); *Dicranoptycha* (2 Eur., 3 N. Am. sp.); *Antocha* (1 Eur., 1 N. Am. sp.); *Trimicra* (2 or 3? Eur., 1 N. Am. sp.); *Symplecta* (3 Eur., 1 N. Am. sp.); *Goniomyia* (5 or 6 Eur., 4 N. Am. sp.); *Empeda* (4 Eur., 1 N. Am. sp.); *Chionea* (2 Eur., 2 N. Am. sp.); *Epiphragma* (1 Eur., 2 N. Am. sp.); *Trichocera* (5 Eur., 4 or 5 N. Am. sp.); *Anisomera* (8 Eur., 1 N. Am. sp.); *Penthoptera* (2 Eur., 1 N. Am. sp.); *Amalopis* (about 8 or 9 Eur., 5 N. Am. sp.); *Dicranota* (about 5 Eur., 2 N. Am. sp.); *Pedicia* (1 Eur., 1 N. Am. sp.); *Ula* (2 Eur., 2 N. Am. sp.); *Cylindrotoma* (2 Eur., 2 N. Am. sp.); *Triogma* (1 Eur., 1 N. Am. sp.); *Phalacrocera* (1 Eur., 1 N. Am. sp.); *Ptychoptera* (5 Eur., 3 N. Am. sp.).

The comparison of the smaller genera again discloses a remarkable agreement in the number of species; the differences, where they occur, are in most cases in favor of the European fauna, and are probably due, in a great measure (for instance in the genus *Anisomera*), to the imperfect knowledge of the North American fauna.

I have shown the points of agreement between the two faunas. The statement of the differences requires much more caution, as the incomplete knowledge of the North American fauna is here to be especially taken into account. It is almost certain that some of the genera, enumerated above as peculiar to America, will never be found in Europe (for instance *Toxorrhina, Elephantomyia, Eriocera*); on the other hand, it is far from certain that the genera hitherto found in Europe only, may not yet be discovered on the American continent (as *Orimarga* and *Elliptera*). As far as my knowledge goes, the difference between the two faunas may be expressed in the following terms: *Whenever the North American fauna differs from the European in the occurrence of a peculiar generic form, or in a marked prevalence of another, this difference is due, either to an admixture of South American forms, or of forms peculiar to the amber fauna.*

If we look over the North American genera, not occurring in Europe, we find that, among those genera, *Toxorrhina* is a South American and West Indian form; *Elephantomyia* occurs in amber; *Erioceræ* with short antennæ are abundant in South America; those with long antennæ in the male sex have been found in amber. *Protoplasa* is represented by *Tanyderus* in

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South America and by *Macrochile* in amber. *Teucholabis*, and some allied, and as yet undescribed forms, are well represented in South America and Mexico; *Gnophomyia* likewise.

Geranomyia is represented in Europe by two rare species; it is common in North America, and still more abundantly represented in South America. Those North American species of *Epiphragma* and *Rhipidia*, which are not represented by analogous forms in Europe, are South American forms.

Some species, characteristic of North America, as *Limnophila* (Lasiomastix) *macrocera* Say, *Limnophila tenuipes* Say, and some other species with long antennæ in the male sex, are represented quite abundantly by analogous forms in amber; one of them, *Limnophila longicornis* Loew, seems to be closely allied to *L. macrocera* Say.

It would be interesting to push the comparison of the two faunas still farther, and, by taking up the genera singly, to compare the North American and the European species, so as to arrive at some results as to analogies or differences in their structure, coloring, or size. From want of materials for such a task, my remarks will be very fragmentary.

In this family, as in most of the other families of Diptera, there is a certain number of species, which are apparently common to Europe and to North America. I say apparently, because with such species one is never sure whether the comparison of a larger number of specimens would not disclose a constant difference. And as every kind of difference, even if constant, does not necessarily constitute a specific character, cases of this kind are often doubtful, and their decision more or less arbitrary.

My opportunities for comparing specimens having been small, it is with such reservations that I have to introduce the list of identical or analogous species of both continents.

The following species, as far as ascertained, seem to be common to Europe and to North America: *Dicranomyia liberta* O. S., *D. longipennis* Schum. (syn. *D. immemor* O. S.), *Rhipidia maculata* Meig., *Symplecta punctipennis* Meig., *Antocha opalizans* O. S.

The identity of the following species is less certain, their resemblance, however, very great: *Dicranomyia morio* Fab. and *morioides* O. S., *Trochobola annulata* Lin. and *T. argus* Say; *Ephelia* (an unnamed European species in my collection, perhaps

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guttata Macq.) and *E. aprilina* O. S., *Idioptera pulchella* Meig. and *I. fasciolata* O. S.; *Amalopis tipulina* Egger and *A. inconstans* O. S.; *Cylindrotoma distinctissima* M. and *C. americana* O. S. Judging from the description of *Limnobia varinervis* Zett., which is an *Amalopis*, it must be very like *A. hyperborea* O. S.

Closely resembling, but certainly different species are *Pedicia rivosa* L. and *P. albivitta* Walk., *Rhipidia uniseriata* Schin. and *R. fidelis* O. S., *Limnobia annulus* Lin. and *L. cinctipes* Say, etc.

An undescribed European *Ula* is very like *U. elegans* O. S. The European and North American species of *Trichocera* are closely alike in appearance, but require comparison.

The comparison of the large genera gives occasion to the following remarks:—

In the genera *Limnobia* and *Limnophila* the species with handsomely pictured wings seem to be more abundant in Europe. The species *Limnobia flavipes* Meig., *sylvicola* Schum., *nubeculosa* M., *nigropunctata* Schum., and similar ones, have no corresponding representatives in North America. The same remark applies to the subgenus *Pœcilostola* Schiner (Limnophila), represented by four species in Germany, and not discovered yet in North America.

In the genus *Erioptera* I am not aware of the occurrence in Europe of the subgenera *Mesocyphona* O. S. and *Acyphona* O. S.; however the European *Eriopteræ* are very imperfectly classified.

If my limited knowledge prevents me from pushing very far the comparison of the North American with the European fauna, I have still less means for a comparison with the faunas of the other parts of the world. Almost nothing is known about them; the scanty facts in our possession will be mentioned, however, in the respective sections and genera.

8. *On the species of North American* TIPULIDÆ BREVIPALPI (including the *Cylindrotomina* and *Ptychopterina*), *described in former publications.*

Forty-four *Tipulidæ* coming within the scope of the present volume have been enumerated in my *Catalogue of the Described Diptera of North America*, Washington, 1858. Omitting two collection-names of Mr. Harris, which had never been published

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before, and five species from the West Indies and Mexico, thirty-seven species remain. These are :—

1. *Erioptera caliptera* Say, described below under the same name.

2. *Erioptera fascipennis* Zett. ; a *Rhypholophus*, closely allied to *R. nubilus*, but apparently distinct; unknown to me; its description is reproduced in the *Appendix* I.

3. *Pedicia albivitta* Walk. is described below under the same name.

4. *Limnobia argus* Say = *Trochobola argus* (comp. below).

5. *Limnobia badia* Walk. = *Dicranomyia badia* (comp. below).

6. *Limnobia biterminata* Walker (*Dipt. Saund.* V, p. 437), according to the author's description, has two submarginal and five posterior cells; the first submarginal with a very short petiole; the præfurca rectangular near its origin, etc. I know of no species to which this description can be applied; it suggests *L. luteipennis*, but this species is three lines long, and not six, the antennæ are not tawny at the basis, the wings are not "grayish," but brownish; the second marginal cell has not a short, but a long petiole; the third vein does not form a very obtuse angle near its basis. Moreover there is a contradiction in Mr. Walker's description; the diagnosis says "abdomen basi fulvum;" the description on the contrary has: "abdomen tawny at the tip." This description is reproduced at the end of this volume.

7. *Limnobia cana* Walk. I have seen the original of this species at the British Museum and took it for *Symplecta punctipennis*. I overlooked at that time Mr. Walker's statements about the differences between these two species (*List, etc.* I, p. 49). Nevertheless these statements are not quite clear, and would not influence my opinion in the absence of the original specimen.

8. *Limnophila carbonaria* Macq. is a species unknown to me, the description of which is reproduced at the end of this volume.

9. *Limnobia cinctipes* Say is described below under the same name.

10. *Limnobia contermina* Walk. is probably a variety of *Pedicia albivitta* (compare this species).

11. *Limnobia fascipennis* Say = *Epiphragma fascipennis*.

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12. *Rhamphidia flavipes* Macq. is described below under this name.

13. *Limnobia gracilis* Wied. is either a *Limnophila* or an *Amalopis*, distinguished by its large size (7 lines) and its abdomen being much longer than the wings. The description of this species is reproduced in the Appendix to this volume.

14. *Limnobia humeralis* Say; a *Limnophila*. I would incline to the opinion of Wiedemann and consider this species as synonymous with *L. tenuipes* Say, if in a copy of Wiedemann's work at the Academy of Natural Sciences in Philadelphia I had not found a marginal note, in Say's handwriting, positively denying this synonymy. Say describes only a female; the venation is the same as that of *tenuipes*, and altogether the resemblance of the two species must be very great. I reproduce the description of *L. humeralis* in the Appendix.

15. *Limnobia ignobilis* Walk. (*Dipt. Saund.*) has the venation like Meigen, Tab. VI, fig. 5, that is, a single submarginal cell; there is a stump of a vein near the origin of the præfurca. I know of no such species. The description will be reproduced in the Appendix to this volume.

16. *Limnobia macrocera* Say = *Limnophila macrocera* (comp. below).

17. *Limnobia prominens* Walk. is very probably *Rhamphidia flavipes* Macq.

18. *Limnobia rivosa* of Fabricius' *Fauna Grœnlandica* is probably *Pedicia albivitta*, which is indeed very like the European *Pedicia rivosa*.

19. *Limnobia rostrata* Say = *Geranomyia rostrata* (comp. below).

20. *Limnobia simulans* Walk. = *Dicranomyia defuncta* O. S. I have seen the original at the British Museum, an old and faded specimen. Mr. Walker describes the species as "pale yellow, legs yellow, tips of thighs, of the shanks and of the feet black;" whereas, in reality, the body is blackish, the legs are dark brown, almost black, with a white band before the tip, etc.

21. *Limnobia tenuipes* Say = *Limnophila tenuipes* (comp. below).

22. *Limnobia turpis* Walk. (*Dipt. Saund.*). Venation like Meig. Tab. V, fig. 5, that is, a single submarginal cell and five posterior cells. All the known *Limnobiæ* with a single sub-

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marginal cell have four posterior cells, and there is only one exception to this rule: *Cylindrotoma distinctissima* and its vicarious North American form—*C. Americana;* Meigen's figure represents the wing of the former. Therefore Mr. Walker's description must either refer to some species entirely unknown to me, or more probably, the statement about its wings being like Meigen, Tab. V, fig. 5, must be erroneous. Moreover, the name *L. turpis* cannot be retained, as Mr. Walker himself has described another *L. turpis* in the *Insecta Britannica, Diptera*, Vol. III, p. 300, in the same year 1856. The description is given in the Appendix to this volume.

23. *Limnobiorhynchus canadensis* Westw. = *Geranomyia canadensis* (comp. below).

24. *Anisomera longicornis* Walk. = *Eriocera longicornis* (comp. below).

25. *Chionea aspera* Walk. = *Chionea valga* Harris (comp. below).

26. *Chionea scita* Walk.; unknown to me; the description is reproduced in the Appendix.

27. *Chionea valga* Harris, described below under the same name.

28. *Trichocera bimacula* Walk.
29. *Trichocera gracilis* Walk.
30. *Trichocera brumalis* Fitch.
31. *Trichocera scutellata* Say.

} The descriptions of these somewhat doubtful species are reproduced in the Appendix I; compare also the genus *Trichocera*.

32. *Trichocera maculipennis* Meig.; a European species said to occur in Greenland, according to Stæger.

33. *Trichocera regelationis* Lin.; also a European species, quoted by Otto Fabricius, as occurring in Greenland, which requires confirmation.

34. *Gynoplistia annulata* Westw. I have seen the original specimen in Mr. Hope's collection at Oxford, and have never met with any other. Mr. Westwood's description is reproduced in *Appendix* I.

35. *Bittacomorpha clavipes* is described below under the same name.

36, 37. *Ptychoptera metallica* Walk. and *quadrifasciata* Say are unknown to me; their descriptions will be found in the Appendix.

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Since the publication of my *Catalogue*, etc., a *Limnobia nigricola* Walk. has been described in the *Trans. Lond. Entom. Soc.* V, N. S. pt. VII, p. 66. It is apparently my *Gnophomyia luctuosa*.

The result of the foregoing examination is the following:—

Omitting the six species of the genus *Trichocera*, which requires an entire revision, eleven species, among the thirty-two which have been described, have not been identified; of these six or seven, because they have not been among the number of species which I have had for examination: *Limnophila carbonaria* Macq.; *Gynoplistia annulata* Westw.; *Rhypholophus fascipennis* Zett.; *Limnobia gracilis* Wied.; *Ptychoptera quadrifasciata* Say and *metallica* Walk.; *Chionea scita* Walker may perhaps be added to the number. The four remaining species (*L. humeralis* Say, *biterminata*, *ignobilis*, and *turpis* Walker) have not been identified on account of the insufficiency of the descriptions.

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TABLE FOR DETERMINING THE GENERA.[1]

1 { Two longitudinal veins between the fifth vein and the posterior margin. 2
Only one longitudinal vein between the fifth vein and the posterior margin; Tab. II. fig. 19 and 20 (Sect. VIII. **Ptychopterina**). 45

2 { Last joint of the palpi shorter or not much longer than the two preceding joints taken together; the auxiliary vein usually ends in the costa, and is connected with the first longitudinal vein by a cross-vein. 3
Last joint of the palpi very long, whiplash-shaped, much longer than the three preceding joints taken together; the auxiliary vein ends in the first longitudinal vein; no cross-vein between it and either of the two veins running alongside of it (*Tipulidæ longipalpi*).

3 { A single submarginal cell;[2] Tab. I, fig. 1–13. 4
Two submarginal cells;[3] Tab. I, fig. 14–20, and Tab. II, fig. 1–18. 6

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[1] This table contains all the known European and North American genera of the eight first sections of the *Tipulidæ;* the table for the following sections (*Tip. longipalpi*) will be appended to the volume treating of them. In using dichotomical tables it should always be remembered that to construct them in such a way as to meet all cases, to include all the anomalous structures, is impossible, and if it were possible, it would be only through the use of anatomical characters, which would defeat the object in view, the facility of determination. Thus, if, in order to accommodate *Chionea*, we had abstained from the use of any character connected with the wings, we would perhaps have rendered the table more precise, but certainly less useful. As it is, *Chionea*, although wingless, is placed among the genera provided with two submarginal cells, where it belongs. These imperfections of the dichotomical tables occur especially in those portions of them which refer to the larger divisions; as soon as the genera and species are reached, more precision can be expected, although even there it can never be absolute.

[2] *Toxorrhina* has none at all.

[3] *Cladolipes* has only a single submarginal cell, although it belongs to this division.

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4 { Antennæ 14- (sometimes apparently 15-) jointed (Section I. **Limnobina**). 9
Antennæ 16-jointed.[1] 5

5 { The first longitudinal vein ends in the costa; tibiæ without spurs at the tip (Section II. **Limnobina anomala**). 13
The first longitudinal vein is usually incurved towards the second and ends in it; tibiæ always with spurs at the tip (Section VII. **Cylindrotomina**). 43

6 { Tibiæ without spurs at the tip (Section III. **Eriopterina**). 22
Tibiæ with spurs at the tip.[2] 7

7 { Subcostal cross-vein posterior to the origin of the second longitudinal vein. 8
Subcostal cross-vein anterior to the origin of the second longitudinal vein; Tab. II, fig. 14–18 (Section VI. **Amalopina**). 38

8 { Antennæ 16-jointed (Section IV. **Limnophilina**). 32
Antennæ from 6- to 10-jointed (Section V. **Anisomerina**). 35

Section I. Limnobina.

9 { Proboscis longer than the head and thorax taken together. Gen. II. Geranomyia.
Proboscis not longer than the head. 10

10 { Antennæ pectinate or subpectinate. Gen. III. Rhipidia.
Antennæ of the ordinary structure. 11

11 { A cross-vein unites the sixth and the seventh longitudinal veins. Gen. V. Trochobola.
No cross-vein between the sixth and the seventh longitudinal veins. 12

12 { The forceps of the male consists of two movable fleshy lobes; tip of the auxiliary vein usually opposite, or anterior, or only a short distance posterior to the origin of the second vein; marginal cross-vein always at the tip of the first longitudinal vein; feet slender. Gen. I. Dicranomyia.
The forceps of the male consists of two horny hooks; tip of the auxiliary vein usually far beyond the origin of the second vein; marginal cross-vein sometimes at the tip, but often some distance before the tip of the first longitudinal vein; feet comparatively stout. Gen. IV. Limnobia.

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[1] In *Elephantomyia* the antennæ are 15-, in *Toxorrhina* 12-jointed; in both cases through the evident coalescence of several joints at the basis of the flagellum; but as both genera have a rostrum which is nearly as long as the body, they will not easily be mistaken.

[2] The spurs being sometimes very small, the tibiæ have to be very closely examined.

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Section II. **Limnobina anomala.**

13 { Rostrum conspicuously prolonged, at least as long as the head, sometimes nearly as long as the whole body; no marginal cross-vein (Subsection *Rhamphidina*). 14
Rostrum shorter than the head. 16

14 { Wings without submarginal cell; Tab. I, fig. 6. Gen. VIII. TOXORRHINA.
Wings with a submarginal cell. 15

15 { Rostrum not much longer than the head. Gen. VI. RHAMPHIDIA.
Rostrum not much shorter than the whole body. Gen. VII. ELEPHANTOMYIA.

16 { Discal cell open. 17
Discal cell closed. 19

17 { Second basal cell considerably shorter than the first, the great cross-vein being placed about the middle of the wing. 18
Second basal cell of about the same length with the first, the great cross-vein being in its usual position; Tab. I, fig. 1c. Gen. XI. ELLIPTERA.

18 { The discal cell being open, is coalescent with the second posterior cell; Tab. I, fig. 9. Gen. X. ORIMARGA.
The discal cell being open, is coalescent with the third posterior cell. Gen. XV. THAUMASTOPTERA.

19 { No vestige of a marginal cross-vein; Tab. I, fig. 13. Gen. XIII. ATARBA.
Marginal cross-vein extant (although sometimes weakly marked). 20

20 { The first longitudinal vein ends in the costa nearly opposite the inner end of the submarginal cell, or very little beyond it. 21
The first longitudinal vein ends in the costa very far beyond the inner end of the submarginal cell, the distance being about equal to the breadth of the wing; Tab. I, fig. 8. Gen. IX. DICRANOPTYCHA.

21 { Submarginal cell as long or but little longer than the first posterior cell: Tab. I, fig. 12 Gen. XIV. TRICHOLABIS.
Submarginal cell much longer than the first posterior cell; Tab. I, fig. 11. Gen. XII. ANTOCHA.

Section III. **Eriopterina.**

22 { No wings. Gen. XIX. CHIONEA.
Wings present. 23

23 { Five posterior cells. Gen. XXVI. CLADURA.
Four posterior cells. 24

24 { The inner marginal cell has the shape of an almost equilateral triangle; Tab. II, fig. 11. Gen. XXV. CRYPTOLABIS.
The inner marginal cell has the usual elongated shape. 25

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25 { Wings conspicuously hairy on the whole surface or along the veins. 26
Wings not conspicuously hairy on the surface, veins glabrous, or almost so. 27

26 { Wings conspicuously hairy on the whole surface. Gen. XVI. RHYPHOLOPHUS.
Wings conspicuously hairy along the veins and not in the cells. Gen. XVII. ERIOPTERA.

27 { The first submarginal cell is remarkably short, half as long as the second or less; Tab. II, fig. 2, 4. 28
The first submarginal cell is much longer than half the length of the second. 29

28 { Marginal cross-vein wanting. Gen. XXIII. GONIOMYIA.
Marginal cross-vein present. Gen. XXIV. EMPEDA.

29 { The distance between the subcostal cross-vein and the tip of the auxiliary vein is more than twice the length of the great cross-vein. 30
The distance between the subcostal cross-vein and the tip of the auxiliary vein is moderate or small (usually not more than the length of the great cross-vein). 31

30 { Seventh longitudinal vein straight; Tab. II, fig. 1. Gen. XVIII. TRIMICRA.
Seventh longitudinal vein conspicuously bisinuated; Tab. I, fig. 20. Gen. XX. SYMPLECTA.

31 { Body uniformly black. Gen. XXI. GNOPHOMYIA.
Body black, scutellum and pleurae marked with yellow.[1] Gen. XXII. PSILOCONOPA.

Section IV. Limnophilina.

32 { Wings pubescent. Gen. XXIX. ULOMORPHA.
Wings glabrous. 33

33 { Seventh longitudinal vein very short, abruptly incurved towards the anal angle; Tab. II, fig. 13. Gen. XXX. TRICHOCERA.
The seventh longitudinal vein follows the ordinary course. 34

34 { A supernumerary cross-vein between the auxiliary vein and the costa. Gen. XXVII. EPIPHRAGMA.
No supernumerary cross-vein between the auxiliary vein and the costa. Gen. XXVIII. LIMNOPHILA.

Section V. Anisomerina.

35 { Three posterior cells. 36
Four or five posterior cells. 37

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[1] I am not sufficiently acquainted with the European genus *Psiloconopa* to distinguish it from *Gnophomyia* in a satisfactory manner; the distinction given here is merely empirical. (Compare their descriptions below.)

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36 { A single submarginal cell Gen. XXXII. CLADOLIPES.
{ Two submarginal cells; Tab. II, fig. 12. Gen. XXXI. ANISOMERA.

37 { The stigma occupies nearly the whole space between the tip of the auxiliary vein and the marginal cross-vein; pubescence of the wing-veins hardly perceptible. Gen. XXXIII. ERIOCERA.
{ The stigma occupies but a small portion of the space between the tip of the auxiliary vein and the marginal cross-vein; pubescence of the wing-veins distinct. Gen. XXXIV. PENTHOPTERA.

Section VI. **Amalopina.**

38 { Antennæ 16- or 17-jointed. 39
{ Antennæ 13-jointed. 41

39 { Four posterior cells; wings pubescent. Gen. XXXVII. ULA.
{ Five posterior cells; wings glabrous. 40

40 { The small cross-vein is nearly at right angles with the longitudinal axis of the wing; last joint of the palpi not longer than the two preceding joints taken together. Gen. XXXV. AMALOPIS.
{ The small cross-vein is in a very oblique direction with regard to the longitudinal axis of the wing, and in one line with the great cross-vein; last joint of the palpi longer than the three preceding joints taken together. Gen. XXXVI. PEDICIA.

41 { Two cross-veins between the first longitudinal vein and the anterior branch of the second vein; Tab. II, fig. 16. Gen. XXXVIII. DICRANOTA.
{ Only one cross-vein between the first longitudinal vein and the anterior branch of the second vein. 42

42 { Four posterior cells; Tab. II, fig. 18. Gen. XXXIX. PLECTROMYIA.
{ Five posterior cells; Tab. II, fig. 17. Gen. XL. RHAPHIDOLABIS.

Section VII. **Cylindrotomina.**

43 { Head and intervals of the thoracic stripes with dense, deep punctures. Gen. XLII. TRIOGMA.
{ Head smooth. 44

44 { Coloring of a *Pachyrhina:* yellow and black. Gen. XLI. CYLINDROTOMA.
{ Coloring of a *Tipula:* brownish and grayish. Gen. XLIII. PHALACROCERA.

Section VIII. **Ptychopterina.**

45 { First submarginal cell much shorter than the second. Gen. XLVI. PROTOPLASA.
{ Second submarginal cell much shorter than the first. 46

46 { Three posterior cells; Tab. II, fig. 20. Gen. XLV. BITTACOMORPHA.
{ Four posterior cells; Tab. II, fig. 19. Gen. XLIV. PTYCHOPTERA.

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SYSTEMATIC DISTRIBUTION OF THE TIPULIDÆ.[1]

I. TIPULIDÆ BREVIPALPI.

A. A single submarginal cell.

1. Antennæ 14-, sometimes apparently 15-jointed.

Section I. **LIMNOBINA.**

Gen. I. **Dicranomyia.**
Gen. II. **Geranomyia.**
Gen. III. **Rhipidia.**
Gen. IV. **Limnobia.**
Gen. V. **Trochobola.**
Gen. *Peripheroptera* Schin. (S. Amer.).

2. Antennæ 16-jointed.

Section II. **LIMNOBINA ANOMALA.**

(Subsection *Rhamphidina.*)
Gen. VI. **Rhamphidia.**
Gen. VII. **Elephantomyia.**
Gen. VIII. **Toxorrhina.**
Gen. X. **Orimarga.**
Gen. XI. **Elliptera.**
Gen. XII. **Antocha.**
Gen. XIII. **Atarba.**
Gen. XIV. **Teucholabis.**
Gen. IX. **Dicranoptycha.**
Gen. XV. **Thaumastoptera.**
Genera: *Styringomyia* Loew (in amber and copal) and *Paratropesa* Schin. (Mexico, S. America).

B. Two submarginal cells.

1. No spurs at the tip of the tibiæ.

Section. III. **ERIOPTERINA.**

Gen. XVI. **Rhypholophus.**
Gen. XVII. **Erioptera.**
Gen. XVIII. **Trimicra.**
Gen. XIX. **Chionea.**
Gen. XX. **Symplecta.**
Gen. XXI. **Gnophomyia.**
Gen. XXII. **Psiloconopa.**
Gen. XXIII. **Gonomyia.**
Gen. XXIV. **Empeda.**
Gen. XXV. **Cryptolabis.**
Gen. XXVI. **Cladura.**
Genera. *Sigmatomera* O. S. (Mexico) and (?)*Lachnocera* Phil. (Chile).

[1] Besides the European and North American genera, this table mentions the other genera hitherto described; they are printed in italics and not numbered. Most of them I have not examined, and have no opinion about their value. Those, the position of which in the section where they are placed, is doubtful, are marked with a query.

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2. Tibiæ with spurs at the tip.

a. Subcostal cross-vein *posterior* to the origin of the second longitudinal vein.

α. Normal number of the antennal joints *sixteen*.

Section IV. **LIMNOPHILINA.**

Gen. XXVII. **Epiphragma.** Gen. XXIX. **Ulomorpha.**
Gen. XXVIII. **Limnophila.** Gen. XXX. **Trichocera.**
Genera: ***Gynoplistia*** Westw. (Australia, America), ***Cloniophora*** Schin. (Australia), ***Cerozodia*** Westw. (Australia), ***Ctedonia*** Phil. (Chile), ***? Polymoria*** Phil. (Chile).

β. Normal number of antennal joints from six to ten.

Section V. **ANISOMERINA.**

Gen. XXXI. **Anisomera.** Gen. XXXIII. **Eriocera.**
Gen. XXXII. **Cladolipes.** Gen. XXXIV. **Penthoptera.**
Genera: ***Evanioptera*** Guér. (S. America), ***Pterocosmus*** Walk. (Asia), ***Oligomera*** Dolesch. (Java), ***Physecrania*** Bigot (Madagascar). *N. B.*—All these genera are closely allied to *Eriocera*, some of them probably synonymous with it.

b. Subcostal cross-vein *anterior* to the origin of the second longitudinal vein.

Section VI. **AMALOPINA.**

Gen. XXXV. **Amalopis.** Gen. XXXVIII. **Dicranota.**
Gen. XXXVI. **Pedicia.** Gen. XXXIX. **Plectromyia.**
Gen. XXXVII. **Ula.** Gen. XL. **Rhaphidolabis.**
Genus ***? Polymera.***

II. TIPULIDÆ INCERTÆ SEDIS.

Section VII. **CYLINDROTOMINA.**

Gen. XLI. **Cylindrotoma.** Gen. XLIII. **Phalacrocera.**
Gen. XLII. **Triogma.**

Section VIII. **PTYCHOPTERINA.**

Gen. XLIV. **Ptychoptera.** Gen. XLVI. **Protoplasa.**
Gen. XLV. **Bittacomorpha.**
Genus ***Tanyderus*** Phil. (Chile).

III. TIPULIDÆ LONGIPALPI.

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Section I. LIMNOBINA.

One submarginal cell; four posterior cells. Normal number of antennal joints fourteen (sometimes apparently fifteen). Eyes glabrous. Tibiæ without spurs at the tip. Ungues with more or less distinct teeth on the under side. Empodia indistinct or none.

The group thus characterized is natural and compact. It comprises about one-fourth of the known brevipalpous *Tipulidæ* of the United States (35 species among 135), and it seems that in Europe nearly the same proportion obtains (in Austria 31 species among 127, according to Dr. Schiner's enumeration). The forms of this section, belonging to the temperate regions of Europe and America (and hardly anything is known about the species from warmer climates) afford but little structural diversity and their relationship is so great and evident that one is almost more tempted to unite them all in one genus than to subdivide them in several.

The *Limnobina*, together with the *Limnophilina*, constituted the bulk of the genus *Limnobia* in Meigen's sense. These two groups also very nearly correspond to the first subdivision of Meigen's genus by Macquart, in *Limnobia* Macq. and *Limnophila* Macq. Thus, we may look upon these two groups as the representative ones of the brevipalpous *Tipulidæ*. It was the great similitude of their outward appearance, more than anything else, which caused the species belonging to them to remain united together in the same genus from Meigen's time up to that of the latest publications, whereas genera like *Rhipidia*, *Rhamphidia*, *Erioptera*, *Anisomera*, *Pedicia*, etc., were singled out and separated quite early, not on account of any real knowledge of the peculiarities of their organization, but merely on the ground of some one conspicuous character distinguishing them. And yet, the contrast of characters, presented by the *Limnobina* and the *Limnophilina* is very great and extends to almost every portion

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of their organization. This contrast is expressed in the following two columns:—

Limnobina.	*Limnophilina.*
Epistoma longer than broad.	Epistoma generally transverse (broader than long).
Flabs of labium linear, narrow.	Flabs of labium broad and fleshy.
Antennæ 14-jointed.	Antennæ 16-jointed.
One submarginal cell.	Two submarginal cells.
Auxiliary vein often short, its tip being then anterior to the inner end of the submarginal cell.	Auxiliary vein generally long, its tip being almost always nearly opposite the inner end of the submarginal cell.
The great cross-vein is almost always at the inner end of the discal cell, or before it.	The great cross-vein is very often opposite the middle of the discal cell.
Four posterior cells.	Five (seldom four) posterior cells.
Tibiæ without spurs at the tip.	Tibiæ with spurs.
Ungues dentate on the under side.	Ungues smooth.
Empodia indistinct or none.	Empodia distinct.
A horny, elongated, immovable style on the under side of the forceps, in the male.	No horny, immovable style on the under side of the forceps.
Upper valves of the ovipositor often very short (especially in the genus *Dicranomyia*).	Upper valves of the ovipositor generally long.

The teeth on the under side of the ungues of the *Limnobina* seem to be peculiar to this section. They must not be confounded with the more or less square or sharp projection on the under side at the very basis of the ungues, forming a part of the thickening which always exists there. The tooth of the *Limnobina*, even when single, is distinct from this thickening, and placed before it (outside of the *Limnobina*, *Antocha* is the only genus which seems to have something like this tooth). The style on the under side of the male forceps is also peculiar to this group; I have observed something analogous to it only among the *Tip. anomalæ* (*Dicranoptycha*, *Antocha*).

The North American and European *Limnobina*, as far as known, may be divided in two natural groups, one of which has, in most cases, a short auxiliary vein, the marginal cross-vein always at the very tip of the first longitudinal vein, and the male forceps formed of two fleshy lobes (*Dicranomyia*, *Rhipidia*, *Geranomyia*); the other group has, with rare exceptions, a long

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auxiliary vein, the marginal cross-vein is sometimes at the tip, but more often at some distance from the tip of the first longitudinal vein, and the male forceps consists of two horny hooks (*Limnobia*, *Trochobola*). Little is known about the forms of *Limnobina* peculiar to the tropical regions and foreign to Europe and North America. The Berlin Museum possesses several species from Mexico and Brazil, with a supernumerary cross-vein in the submarginal cell; the auxiliary cross-vein has its tip nearly opposite the origin of the second longitudinal vein; the ungues have strong and distinct teeth; the wings are spotted. These species will form a distinct genus.[1] Another, still more aberrant form from South America, is represented by several species in the same museum. In Mr. Bellardi's collection, in Turin, I have seen a species from the Philippine Islands, remarkable for its coloring; it is black, with smoky wings; the thorax is orange red.

As far as I can judge from the description of the genus *Peripheroptera* Schiner (*Verh. Zool. Bot. Ges.* etc. 1866, p. 933, and *Reise d. Novara*, etc. *Diptera*, p. 47), it is only a form of *Dicranomyia;* the generic character will be found in the *Appendix* II.

Gen. I. DICRANOMYIA.

One submarginal cell; four posterior cells; discal cell present or absent; marginal cross-vein at the tip of the first longitudinal vein; tip of the auxiliary vein generally opposite or before the origin of the second longitudinal vein, seldom beyond it (wings of *Dicranomyiæ*, Tab. I, fig. 1, 2, 3). Antennæ 14-jointed, joints subglobular, elliptical, or short subcylindrical. Proboscis not longer than the head. Feet slender, tibiæ without spurs at the tip; empodia indistinct or none. The forceps of the male consists of two movable, soft, fleshy, subreniform lobes and a horny style under them (Tab. III, fig. 2, 3, 5).

Rostrum subcylindrical, projecting; epistoma longer than broad, narrowed at the sides; the narrow, linear, pubescent flabs of the under lip project more or less beyond it. In *D. rostrifera*, rostrum and proboscis are nearly as long as the head; usually, however, they are shorter; palpi short. Eyes large, glabrous, front rather narrow. The antennæ are comparatively short, as they do not reach the root of the wings, when bent backwards; the joints of the flagellum are subglobular or elliptical;

[1] *Limnobia diva* Schiner (*Reise d. Novara, Diptera*, p. 46), from Brazil, is apparently a species of this kind.

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seldom short subcylindrical (as in *D. immodesta, gladiator*); with moderately long, often inconspicuous verticils (in the two species just named, the verticils are somewhat longer than usual). The collar is broad, well developed, triangular at a side-view; with a neck-like prolongation, carrying the head; thoracic suture well marked. The feet are slender, with a very inconspicuous, almost microscopic pubescence, and, as a general rule, of a uniform coloring. Most of the species have a distinct tooth on the under side of the ungues, near the basis, sometimes followed by a smaller one. In *D. defuncta*, these teeth are replaced by a few notches on the under side of the ungues. In some species, as in *D. hæretica*, the teeth are very small and difficult to perceive.

The venation follows rather closely a certain uniform type, and but few of the characters taken from it can be used for the distinction of the species. The auxiliary vein generally ends in the costa nearly opposite the origin of the second longitudinal vein; in some species it is still shorter and ends before the origin of the second vein (*D. rostrifera, brevivena*, and *floridana*), and it is an exception when it reaches considerably beyond the origin of that vein (*D. defuncta, pubipennis, rara, globithorax*). The distance of the subcostal cross-vein from the tip of the auxiliary vein, which is variable, affords good specific characters. The first longitudinal vein ends in the costa near the posterior end of the stigma, nearly opposite the tip of the fifth longitudinal vein and more or less beyond the inner end of the submarginal cell; often at one-third, at the utmost about the middle of this cell; the marginal cross-vein is close at the tip of the first longitudinal vein; in most species, this cross-vein forms a nearly straight line with the tip of the first longitudinal vein; often, however, the upper half of this straight line recedes a little backwards and in such cases it appears as if the first longitudinal vein was incurved towards the second and ended in it, while the cross-vein in such a case seems to connect the first longitudinal vein with the costa. Such is the case with *D. pubipennis* (Tab. I, fig. 2) and *globithorax;* sometimes this character is not specific, but merely adventitious. The course of the second longitudinal vein varies in the relative length of the two portions of this vein, before and after emitting the third vein. The inner portion or the præfurca is remarkably short in those species which have a very short auxiliary vein (*D. rostrifera, brevivena, floridana*).

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The submarginal cell is always a good deal longer than the first posterior cell; the relative proportion of their length is subject to slight variations. When the discal cell is open, which characterizes several species, it coalesces with the second posterior cell, in consequence of the absence of the cross-vein, connecting the two first veins emitted by it towards the margin of the wing. *D. pubipennis* (Tab. I, fig. 2) is the only exception I know of, to this rule; whenever in this species the discal cell happens to be open, it coalesces with the *third* posterior cell, because it is the cross-vein connecting the *two last* veins, emitted by the discal cell, which is wanting. As a rule, the discal cell is open in *D. immodesta, gladiator, rostrifera, floridana, longipennis, brevivena;* it is closed in *D. diversa, pudica, halterata, distans, stulta, hæretica, liberta, defuncta, rara, humidicola, morioides.* Among twenty specimens of *D. pubipennis* five had the discal cell open; of my two specimens of *D. globithorax* one has this cell open, the other closed. But even in the species which have the discal cell either open or closed as a rule, occasional exceptions occur; this character is therefore not an altogether reliable one, and can be established only upon the comparison of a number of specimens. The shape of the discal cell is more or less square; its inner end is either in a line with the small cross-vein, or somewhat arcuated and projecting on the inside beyond this cross-vein. The position of the great cross-vein is generally in a line with the inner end of the discal cell; sometimes a little anterior or posterior to this line; it varies in different specimens of the same species.

The male forceps consists of a pair of movable, fleshy lobes, oblong, often subreniform, each being armed on the inside with a short, curved horny appendage, somewhat resembling a beak (I call it *rostriform* appendage); it often bears upon its convex side one or two stiff bristles (see Tab. III, fig. 3 and 5, *d*). To the upper side of each of the lobes, another horny appendage, long, slender, attenuated, curved, is closely applied (*falciform* appendage); its point of attachment is the basal piece below (fig. 5 and 3, *b*). The forceps of *D. humidicola* (fig. 2) and that of *D. liberta* (fig. 3), with their full, rounded lobes may be considered as typical. Often, these lobes are more slender, sinuated or excised on the inside, such are for instance, those of *D. defuncta* (fig. 1); or somewhat club-shaped towards the tip, as in *D. hæretica.* Below these lobes, at the end of the body, on the

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under side, is the *style* (fig. 1 and 5*a*, *e*, and fig. 3, *a*), a horny projection, characteristic of this group.

The European species *Dicr. autumnalis* and *D. stigmatica* (placed by Stæger in the genus *Glochina*) show a remarkable modification in the male forceps. In *D. stigmatica* the fleshy lobes are much larger than usual, and their skin is a delicate whitish membrane (compare the figures given by me in the *Stett. Entomol. Zeitschr.* 1854, Tab. I, fig. 5–7); their rostriform appendages are very large, branched, antler-like; below the lobes, there is a second, hairy, coriaceous forceps; below this, a pair of conical processes, clothed with long hair and pointing towards each other; the horny style is between them. *D. autumnalis* (l. c. fig. 6) has these conical processes largely developed; in other respects, its forceps has the ordinary structure.

The ovipositor of *Dicranomyia*, among those of the other sections of *Tipulidæ*, is remarkable for its smallness. The upper valves are short, narrow, arcuated, pointed; the lower ones are straight. The ovipositor of *D. hæretica* is exceedingly small.

The coloring of the body in this genus is rather monotonous and dull; grayish, brownish or ochraceous; without the well-marked stripes, bands, and spots which adorn the body, the feet, and the wings of *Limnobia*. Among nineteen species of North American *Dicranomyiæ* only two, rather abnormal species in more than one respect, have spotted wings (*D. defuncta* and *D. rara*); a single species has them clouded (*D. humidicola*). In Europe, *Dicranomyiæ* with clouded wings seem to be more numerous. The European *D. ornata* has handsomely banded wings. However, I am not sufficiently acquainted with the European fauna to make any general statement about the numerical proportion between the species with immaculate and those with clouded wings.

The habits of the larvæ are probably aquatic, or subaquatic. I am not aware that any larva of this genus has been described, but I have observed near Washington, D. C., a larva, which I have every reason to suppose is that of *D. defuncta*. It lived upon the wood-work of a mill-dam, with a stream of water constantly passing over it. However, Mr. Winnertz reared *D. dumetorum* from decaying beech stumps (*Linnæa Entomol.* VIII, p. 281).

Dicranomyia probably occurs in all parts of the world,

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although it may be principally at home in the more temperate latitudes. *D. vicarians* from Aukland and *D. morionella* from S. America, have been described by Dr. Schiner in the *Reise d. Novara, etc., Diptera*, p. 46. The *Limnobiæ fumipennis, chorica, ægrotans*, and *gracilis* from New Zealand, mentioned in Walker's *List of Dipt. Brit. Mus.*, are all *Dicranomyiæ*. The genus *Ataracta*, found in amber (Loew, *Bernst. u. Bernsteinfauna*) is apparently synonymous with *Dicranomyia*.

This genus is very closely allied to *Limnobia*, still the differences between them are numerous. They consist:—

1. In the structure of the body: The feet of *Dicranomyia* are generally more slender; the ungues have usually but one distinct tooth, whereas in *Limnobia* there are several; the male forceps in the two genera has a different structure. As to the latter point, however different the two forms may be, I look upon them as modifications of the same plan of structure, the whole difference consisting in the more or less development of the fleshy lobes. If we represent to ourselves the large fleshy lobes of *Dicranomyia* lessened, the rostriform horny appendage, being closely applied to the falciform appendage (marked *b* on the figures of Tab. III), will form the double horny hook of *Limnobia*. Intermediate forms really occur in some species; the forceps of *Trochobola*, for instance, is one of them. We have already noticed above the contrast in the coloring between the two genera; that of *Limnobia* being more intense and brilliant, with well-defined stripes, bands, and dots on the body, the wings and the feet.

2. In the mode of life: Most of the larvæ of *Dicranomyia* are probably aquatic or subaquatic, whereas those of *Limnobia* live in wood, fungi, etc.

3. In the venation: The auxiliary vein in *Dicranomyia* is in most cases shorter; it usually ends in the first longitudinal vein nearly opposite the origin of the second vein or before it. In exceptional cases only (in four North American species among nineteen), this vein is prolonged a considerable distance beyond the origin of the second longitudinal vein. Just the opposite is the case with *Limnobia;* the auxiliary vein is, almost without exception, prolonged considerably beyond the origin of the second vein. The only exception I know of is the European *L. macrostigma* Schum., the auxiliary vein of which is prolonged only a short distance beyond the origin of the second longitudinal vein.

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The relative position of the subcostal cross-vein and of the tip of the auxiliary vein is somewhat different in the majority of the species of both genera. In both of them, the cross-vein is sometimes placed at the tip of the auxiliary vein; but whenever it is removed from this tip, it is *always* situated between the first longitudinal vein and the auxiliary in *Dicranomyia;* in *Limnobia,* on the contrary, it is *very often* situated between the auxiliary vein and the costa; in which case, the auxiliary vein ends in the first longitudinal vein, and not in the costa, as usual. This latter structure, as far as I have observed, occurs only in the genus *Limnobia.*

The relative position of the marginal cross-vein and of the tip of the first longitudinal vein, gives occasion to a somewhat similar observation. In *Dicranomyia* this cross-vein is *always* at the tip of the first longitudinal vein (about the peculiar structure, sometimes occurring here, compare above, page 54). In *Limnobia* the marginal cross-vein is *often* some distance back of this tip, so as to cut the stigma in two, or even to be placed near its inner end. This latter character, as far as my observation goes, may be useful in doubtful cases, as it occurs principally in the less typical *Limnobiæ,* some of which, as for instance *L. macrostigma,* might be mistaken for *Dicranomyiæ.* The typical *Limnobiæ* (*cinctipes, solitaria,* etc.) have the cross-vein close at the tip of the first longitudinal vein, like *Dicranomyia.*

We may also notice here, that the discal cell is often open in the genus *Dicranomyia,* whereas I know of no such case among the *Limnobiæ.*

In my previous essay on the *Tipulidæ brevipalpi,* the genera *Rhipidia, Geranomyia, Dicranomyia,* and *Limnobia* have been united as subgenera of a single genus *Limnobia.* This was done on the ground that *Rhipidia* and *Geranomyia* are much more closely allied to *Dicranomyia* than the latter is to *Limnobia* (in the narrower sense). If therefore we leave *Limnobia* and *Dicranomyia* united, we should not separate *Rhipidia* and *Geranomyia* from them. If, on the contrary, we separate *Rhipidia* and *Geranomyia* from *Dicranomyia,* we should, *à fortiori,* separate *Dicranomyia* from *Limnobia.* This separation has been introduced in the present publication.

The name *Dicranomyia* (from δίκρανον, fork, and μυῖα, fly) has been first used in J. Stephens's *Catalogue of British Insects,* in

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1829, for the species *D. lutea, inusta, modesta, dumetorum, didyma*, etc. In Haliday's *Catalogue of Diptera occurring about Holywood, Devonshire* (*Entomol. Magaz.* I, 147) in 1833, the same generic name is introduced for the species *lutea, inusta, modesta, chorea*, and *oscillans* n. sp. This generic name has not been used in the systematic works which have appeared since (Macquart, Walker, and Zetterstedt) until it was reinstated by me in the *Proc. Acad. Nat. Sci. Phila.* 1859, as a subgenus of *Limnobia*.

The genus *Glochina*, introduced by Meigen in his Vol. VI, p. 280, 1830, for *Glochina sericata* Meig., has not been sufficiently characterized by him, and has never obtained a definite meaning since. The alleged distinguishing characters are the fourteen-jointed antennæ and five-jointed palpi; but it must be borne in mind, that Meigen called the antennæ of *Limnobia* from 15- to 17-jointed (compare above, page 10), and that, for this reason, fourteen-jointed antennæ, which we know now as belonging to the whole section of *Limnobina*, must have seemed unusual to him. As to the palpi, the fifth basal joint is often visible, and not in *Glochina* only; as Mr. Westwood suggests (*Westw. Introd.* II, p. 525) it probably represents the maxilla.

Macquart (*Hist. Nat. des Dipt.* I, p. 172) rather oddly places *Glochina* among the *Tipulariæ florales* of Latreille, between *Rhyphus* and *Simulium*, on the ground that "*Glochina*, together with *Culex* and *Bolitophila*, are the only nemocerous diptera hitherto observed which are provided with maxillary setæ; they are, moreover, distinguished by five-jointed palpi, the third of which is incrassated, like the second in *Rhyphus*."

We find *Glochina* introduced with a query, in Haliday's *Catal. Dipt. Holyw.* for *D. leucocephala* M. (syn. *morio* Fab.) and *dumetorum*, as well as in the *Synopsis*, etc. at the end of Westwood's *Introduction*, etc. Vol. II, for the same species.

Stæger (Krøjer's *Naturh. Tidskr.* Vol. III, 1840) placed three species in it, *Gl. stigmatica, autumnalis*, and *frontalis*, which are *Dicranomyiæ;* at the same time, other *Dicranomyiæ*, as *modesta, dumetorum, chorea, didyma*, are left by him in the genus *Limnobia*. Thus it does not appear upon what the claims of the genus, in this author's sense, are established. Unless the peculiarities in the structure of the male genitals of *G. autumnalis* and *stigmatica*, already alluded to above (p. 56) prove of

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sufficient importance to justify a generic separation of those few species which possess them, the genus *Glochina* will have to be abandoned. By all means *Glochina* cannot be maintained as a name of the group now called *Dicranomyia*. This name, as shown above, has been proposed a year earlier, and was, from the beginning connected with a series of those very species which constitute it now.

Table for the determination of the species.

1. Wings remarkably narrow, lanceolate (Tab. I, fig. 1). 1 **longipennis** *Schum.*
   Wings of the usual shape. 2
2. Tip of the auxiliary vein nearly opposite, or before, or only a short distance beyond the origin of the second longitudinal vein. 3
   Tip of the auxiliary vein a considerable distance beyond the origin of the second longitudinal vein. 16
3. The whole antennæ, or at least their basal joints, pale. 4
   The whole antennæ black or brown. 7
4. Discal cell open. 5
   Discal cell closed. 6
5. Thorax with a single brown stripe in the middle. 2 **immodesta** *O. S.*
   Thorax with three brown stripes. 3 **gladiator** *O. S.*
6. Flagellum of the antennæ and halteres infuscated. 4 **diversa** *O. S.*
   Flagellum and halteres not infuscated. 5 **pudica** *O. S.*
7. Discal cell (in normal specimens) open; tip of the auxiliary vein considerably anterior to the origin of the second vein; the præfurca is about equal in length to the distance between the origin of the third vein and the small cross-vein, or even shorter. 8
   Discal cell closed; tip of the auxiliary vein nearly opposite the origin of the second vein (or, when anterior or posterior, the distance small); præfurca distinctly longer than the distance between the origin of the third vein and the small cross-vein. 10
8. Rostrum and proboscis nearly as long as the head. 6 **rostrifera**, n. sp.
   Rostrum and proboscis much shorter than the head. 9
9. Thorax ochraceous. 7 **brevivena**, n. sp.
   Thorax brown. 8 **floridana**, n. sp.
10. Thorax shining black, pleuræ with a silvery reflection. 15 **morioides** *O. S.*
    Thorax brownish or grayish. 11
11. Femora with a rather broad pale band at the tip. 14 **badia** *Walk.*
    Femora without such a band. 12
12. The distance between the tip of the auxiliary vein and the subcostal cross-vein is nearly as long as the stigma. 13
    The distance between the tip of the auxiliary vein and the subcostal cross-vein is shorter than half the length of the stigma. 14

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13 { Halteres unusually long. 13 **halterata**, n. sp.
Halteres of the ordinary length. 9 **distans** *O. S.*

14 { The cross-vein separating the discal cell from the first basal cell is arcuated in such a manner, that the inner end of the discal cell is but little more distant from the basis of the wing than the inner end of the submarginal cell. 10 **stulta** *O. S.*
The cross-vein separating the discal cell from the first basal cell is not conspicuously arcuated and hence, the inner end of the discal cell is distinctly more distant from the basis of the wing than the inner end of the submarginal cell. 15

15 { Thorax gray, with a brown stripe in the middle. 11 **liberta** *O. S.*
Thorax brownish-yellow, with a brown stripe in the middle. 12 **hæretica**, n. sp.

16 { Wings immaculate. 17
Wings spotted with brown. 18

17 { Stigma distinct. 16 **pubipennis** *O. S.*
No vestige of a stigma. 17 **globithorax**, n. sp.

18 { Wings brownish, three or four brown spots along the anterior margin. 18 **rara**, n. sp.
Wings with brown dots in all the cells. 19 **defuncta** *O. S.*

Description of the species.

1. D. longipennis Schum. ♂ and ♀.—Ochracea, thorace rufescente, vittis tribus obscurioribus; pleuris vittâ fusca; alis angustis, immaculatis, areolâ discoidali apertâ; costâ, venâque longitudinali primâ pallide flavis; vena auxiliaris pone initium præfurcæ perparum extensa.

Ochraceous, thorax reddish above, with three darker stripes, pleuræ with a brown stripe; wings narrow, immaculate; discal cell open; the costa and the first longitudinal veins pale yellow; the auxiliary vein is extended very little beyond the origin of the præfurca (Tab. I, fig. 1). Long. corp. 0.25—0.3.

Syn. *Limnobia longipennis* Schum. Beit. etc. 104, 2.
Dicranomyia immemor O. Sacken, Proc. Ac. Nat. Sc. Phil. 1861, p. 287.

Head brownish, rather elongated, rostrum brown, also somewhat prolonged; palpi and antennæ brownish; second joint of the latter stout; thorax reddish-yellow above, with three indistinct brownish stripes, the intermediate one with a faint yellow line in the middle. Pleuræ with a brown line, bordered with whitish, running from the humeri towards the basis of the halteres; the latter have a whitish stem and a brownish knob; abdomen brownish; feet pale yellow, tip of the tibiæ and tarsi infuscated; wings narrow, lanceolate, their basal, narrowed portion rather long, their color is subhyaline; anal angle small,

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hardly projecting; stigma elongated, pale; costa and first longitudinal veins pale yellow, the other veins brown; tip of the auxiliary vein very little beyond the origin of the præfurca; subcostal cross-vein immediately opposite this origin; tip of the first longitudinal vein a little anterior to the middle of the submarginal cell; the latter rather long, longer than the first posterior cell; the discal cell being open, the first and second posterior cells are of equal length; the third is one-half the length of the second; seventh longitudinal vein somewhat bisinuated.

Hab. Trenton Falls, N. Y., where I caught numerous specimens on a meadow.

In general habitus this species is different from the other *Dicranomyiæ;* its very narrow wings with their yellow costal and first longitudinal veins, forming a contrast with the brown color of the other veins, make it easily recognizable. The structure of its male forceps belongs to the same type with those of the other species of the group. I had at first described *D. longipennis* under the name of *D. immemor*, but recognized afterwards its identity with a species belonging to eastern Europe.

2. D. immodesta O. S. ♂ and ♀.—Ochracea, thoracis vittâ fuscâ; antennis fuscis, basi pallidis; alis hyalinis, stigmate pallido, areolâ discoidali apertâ; venæ auxiliaris apex initio præfurcæ plus minusve oppositus; venula subcostalis transversa ab auxiliaris apice stigmatis longitudine remota.

Ochraceous, thorax with a brown stripe; antennæ brown, pale at the base; wings hyaline, stigma pale; discal cell open; the tip of the auxiliary vein is nearly opposite the origin of the præfurca; the subcostal cross-vein is at a distance from the tip of the auxiliary vein, which is about equal to the length of the stigma. Long. corp. 0.25—0.3.

Syn. *Dicranomyia immodesta* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 211.

Rostrum pale, palpi infuscated; antennæ fuscous, pale at base; verticils rather long; front and vertex infuscated. Thorax ochraceous, paler on the pleuræ; a dark brown stripe, extending over the collare, in the middle; this stripe is abbreviated behind and does not reach the transverse suture; the lateral stripes are not perceptible; both ends of the scutellum and a stripe in the middle of the metathorax usually infuscated. Knob of the halteres dusky; feet pale tawny, coxæ and basis of the femora

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pale yellow; tips of the tarsi darker. Abdomen infuscated above; forceps pale. Wings nearly hyaline; stigma elliptical, pale; veins pale brownish; tip of the auxiliary vein nearly opposite or a little before the origin of the præfurca; the subcostal cross-vein is separated from the tip of the auxiliary vein by a distance at least equal to the length of the stigma, if not longer; the cross-vein, forming the inner end of the discal cell, is straight; discal cell always open.

Hab. Washington; Trenton Falls; Maine.

When I first described this species I had twenty-five specimens for comparison. *D. immodesta* is not unlike the European *D. modesta*, the discal cell of which, however, is closed.

3. D. gladiator O. S. ♂ and ♀.—Ochracea, fuscescens; thoracis vittis tribus fuscis; antennis fuscis, basi pallidis, alis hyalinis, stigmate infuscato; areolâ discoidali apertâ; venæ auxiliaris apex initio præfurcæ plus minusve oppositus; venula subcostalis transversa ab auxiliaris apice stigmatis longitudine remota.

Brownish-ochraceous; thorax with three brown stripes; antennæ brown, pale at base; wings hyaline, stigma infuscated; discal cell open; the tip of the auxiliary vein is nearly opposite the origin of the præfurca; subcostal cross-vein removed from the tip of the auxiliary vein at a distance equal to the length of the stigma. Long. corp. 0.25—0.3.

Syn. *Dicranomyia gladiator* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 212.

Rostrum pale ochraceous, front brownish-gray, palpi infuscated, antennæ brown, pale at base. Thorax brownish ochraceous, with three distinct brown stripes; the intermediate one extends over the collare; the lateral ones extend beyond the suture; scutellum and metathorax brownish in the middle; mesosternum with two large, round brown spots between the fore and middle coxæ and several smaller, indistinct spots; halteres pale at base; knob brown; feet brown, coxæ and base of femora pale; tip of the latter brown. Abdomen brown, posterior margins of the segments and the genitals paler; falciform appendages of the male forceps very large (Tab. III, fig. 4); they are very striking in the living insect, and when their points touch each other, they form a kind of arch or bridge over both lobes. (The name of the insect is derived from these sword-like appendages.) Wings nearly hyaline; stigma elliptical, more or less infuscated; venation exactly like that of *D. immodesta*.

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Hab. Washington; in June.

I found fourteen specimens of this species upon one occasion in Washington. If it was not for the difference in the structure of the male forceps, I would have taken this species for a darker variety of *D. immodesta*. The venation of both is exactly the same.

4. D. diversa O. S. ♂ and ♀.—Ochracea, antennis fuscis, basi pallidis; alis hyalinis, stigmate pallido; areolâ discoidali clausâ; venula subcostalis transversa ab auxiliaris apice stigmatis longitudine remota; venæ auxiliaris apex initio præfurcæ plus minusve oppositus.

Ochraceous, antennæ brown, pale at the base; wings hyaline, stigma pale; discal cell closed; subcostal cross-vein removed from the tip of the auxiliary vein at a distance equal to the length of the stigma; the tip of the auxiliary vein is more or less opposite the origin of the præfurca. Long. corp. 0.2—0.25.

Syn. *Dicranomyia diversa* O. Sacken, Proc. Ac. Nat. Sc. Phila. 1859, p. 212.

The body is ochraceous; the head above, the halteres and the abdomen are infuscated; genitals ochraceous. Antennæ more or less infuscated, basal joints pale. The tip of the auxiliary vein is more or less opposite the origin of the præfurca; the subcostal cross-vein is at a considerable distance from the tip of the auxiliary vein, this distance being at least equal to the length of the stigma; the discal cell is closed; the stigma has a slight brownish tinge.

Hab. Washington, D. C.; Maryland; in the spring.

This species is much smaller than *D. immodesta*, and moreover is easily distinguished from it by its closed discal cell; the verticils of its antennæ are much shorter.

I possess three specimens collected by Mr. R. Kennicott, near Fort Resolution, H. B. T.; they are very like *D. diversa*, but have the thorax darker, the feet more brown above, and the halteres paler. They may belong to a different species.

5. D. pudica O. S. ♂ and ♀.—Pallide ochracea tota; oculis nigris, tarsorum apicibus fuscis; alis pallide flavescentibus; venis pallidis; venæ auxiliaris apex initio præfurcæ parum anterior; venula subcostalis transversa ab auxiliaris apice parum remota.

Altogether pale ochraceous; eyes black; tip of the tarsi fuscous; wings with a pale yellowish tinge; veins pale; the tip of the auxiliary vein

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is a short distance anterior to the origin of the præfurca; the subcostal cross-vein is at a short distance from the tip of the auxiliary vein. Long. corp. 0.3—0.35.

Syn. *Dicranomyia pudica* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 212.

There is not much to add to the diagnosis; the stigma is scarcely apparent; the auxiliary vein joins the costa a little before the origin of the præfurca; the cross-vein is not far from its tip (at a distance shorter than half the length of the stigma); the antennæ are yellow.

Hab. Illinois (Kennicott).

At the time when I prepared the original description of this species, I had two male and four female specimens before me.

6. D. rostrifera, n. sp. ♂ and ♀.—Fusca, thoracis vittâ obscuriori, rostro et proboscide elongatis, fuscis; antennis nigro-fuscis; venæ auxiliaris apex præfurcæ initio anterior; præfurcâ brevi; cellulâ discoidali apertâ.

Brown, the thorax with a darker stripe; rostrum and proboscis elongated, brown; antennæ brown; the tip of the auxiliary vein is anterior to the origin of the præfurca, the latter short; discal cell open. Long. corp. 0.2—0.25.

Head, including rostrum, palpi, and antennæ fuscous; rostrum and proboscis unusually prolonged, being almost as long as the head. Thorax fuscous, sericeous with yellowish above and with a dark brown stripe in the middle; sericeous with cinereous on the pleuræ; scutellum tawny, metathorax brown. Halteres with an infuscated knob, stem pale. Abdomen brown; genitals subferruginous. Feet dark tawny, coxæ pale. Wings hyaline; stigma short oval, pale; the tip of the auxiliary vein is anterior to the origin of the second longitudinal vein by about half the length of the stigma or more; the subcostal cross-vein is at about an equal distance from the tip of the auxiliary vein; the first longitudinal vein has the marginal cross-vein close by its tip; the præfurca is short, not much longer, if longer at all, than the distance between the origin of the third longitudinal vein and the small cross-vein; discal cell open.

Hab. New York; three male, one female specimen. The venation of this species is exactly like that of *L. brevivena.* I

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could not very well describe the color of the front which, in all my specimens, is shrunken.

7. D. brevivena, n. sp. ♂ and ♀.—Ochracea vel fusco-ochracea; rostro ochraceo; antennis nigro-fuscis, thorace vittis tribus fuscis; venæ auxiliaris apex præfurcæ initio anterior; præfurcâ brevi; cellula discoidali plerumque apertâ.

Ochraceous or brownish-ochraceous; rostrum ochraceous; antennæ brownish-black; thorax with three brown stripes; the tip of the auxiliary vein is anterior to the origin of the præfurca; the latter short; the discal cell in most specimens open. Long. corp. 0.2—0.23.

The coloring of the body is either of a light brownish-yellow, or a more ochraceous yellow; head brownish, front infuscated in the middle; rostrum yellow; antennæ dark brown. Thorax ochraceous with three brown stripes, the intermediate one broad and distinct, the lateral ones extending backwards beyond the suture are slightly pruinose with grayish; collare brown above, prolonged in a distinct neck; scutellum infuscated at both ends, metathorax brownish, pruinose with grayish; pleuræ ochraceous, more brownish posteriorly; stem of halteres pale at the basis, knob infuscated. Abdomen brownish above, pale below; male genitals ochraceous. Feet dark tawny; coxæ and base of the femora pale; tarsi brown towards the tip. Wings almost hyaline, very slightly tinged; stigma pale. The tip of the auxiliary vein is anterior to the origin of the præfurca by about half a length of the stigma; the cross-vein is at about an equal distance from the tip of the auxiliary vein; the first longitudinal vein has the marginal cross-vein by its tip; the præfurca is short, in some specimens shorter than the distance between the origin of the third longitudinal vein and the small cross-vein; in other specimens, it is a little longer. The discal cell is usually open; one of my specimens (among ten) has it closed.

Hab. New York; also in Washington, D. C. This species can be easily distinguished from the two other species with a short auxiliary vein (*floridana* and *rostrifera*) by its yellow rostrum.

I have taken, in the marshes on Long Island, near New York, in autumn, several specimens which are somewhat larger and darker in coloring; the thorax is brownish, sericeous with yellowish above, and with three dark brown stripes; the abdomen

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is not paler on the under side, but uniformly brown; the stigma seems to be slightly longer; otherwise they agree with *D. brevivena*, and I am in doubt about their identity.

8. D. floridana, n. sp. ♂ and ♀.—Brunnea, fronte albomicante, rostro brevi, fusco; antennis nigro-fuscis; venæ auxiliaris apex præfurcæ initio anterior; præfurcâ brevi; cellulâ discoidali apertâ.

Brown, front with a whitish reflection, rostrum short, brown; antennæ brownish-black; the tip of the auxiliary vein is anterior to the origin of the præfurca; the latter short; discal cell open. Long. corp. 0.2—0.3.

Head including rostrum and palpi brownish, antennæ black; front with a whitish yellow reflection. Ground color of the thorax dark tawny, almost concealed by the three brown stripes; the intermediate one moderately shining, the lateral ones pruinose with grayish; humeral region finely sericeous with yellowish; metathorax brown, sericeous with brownish-yellow; pleuræ sericeous with gray. Abdomen brown, genitals subferruginous. Halteres with a fuscous knob. Feet dark tawny, coxæ and basis of the femora yellow. Wings somewhat tinged with cinereous; stigma pale; venation like that of *D. brevivena* and *rostrifera*, only the distance between the tip of the auxiliary vein and the subcostal cross-vein is nearly equal to the whole length of the stigma.

Hab. Florida; two male and three female specimens caught by me in the spring of 1858; a pair of them were in copulation.

9. D. distans O. S. ♂ and ♀.—Brunnea; humeris pleurisque pallidioribus; antennis palpisque nigris; venæ auxiliaris apex initio præfurcæ plus minusve oppositus; venula transversa subcostalis ab apice venæ auxiliaris remota; venula transversa quæ cellulam discoidalem a cellulâ basali primâ separat, parum arcuata; alæ immaculatæ; stigmate pallido.

Brown, humeri and pleuræ pale; antennæ and palpi black; tip of the auxiliary vein nearly opposite the origin of the præfurca; subcostal cross-vein at some distance from the tip of the auxiliary vein; the cross-vein, separating the discal cell from the first basal cell, is very little arcuated; wings immaculate; stigma pale. Long. corp. 0.23—0.3.

Syn. *Dicranomyia distans* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 211.

Palpi and antennæ black; joints of the flagellum subglobular; front and vertex grayish-brown. Thorax dark tawny, sericeous

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with yellowish and with brown stripes; the pleuræ with a sericeous, yellowish reflection. Halteres brownish, pale at the root; abdomen brown, genitals paler; feet brownish, coxæ paler. Tip of the auxiliary vein nearly opposite the origin of the præfurca; the subcostal cross-vein is at a distance from the tip of the auxiliary vein which is not much less than the length of the stigma; the cross-vein at the inner end of the discal cell is but very slightly arcuated; discal cell closed.

Hab. Florida.

This species is very like *D. stulta* in general appearance, but easily distinguished by the great distance between the subcostal cross-vein and the tip of the auxiliary vein. I brought six specimens from Florida with me (caught in March, 1858); but I have only two left now. The rostrum seems to be of a pale color; but I cannot perceive it distinctly.

10. D. stulta O. S. ♂ and ♀.—Brunnea, humeris pleurisque pallidioribus; antennis palpisque nigris; venula transversa subcostalis apici venæ auxiliaris approximata; venula transversa quæ cellulam discoidalem a cellulâ basali primâ separat, valde arcuata; alæ immaculatæ, stigmate pallido.

Brown, humeri and pleuræ pale; antennæ and palpi black; subcostal cross-vein near the tip of the auxiliary vein; the cross-vein separating the discal cell from the first basal cell is strongly arcuated; wings immaculate, stigma pale. Long. corp. 0.22—0.3.

Syn. *Dicranomyia stulta* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 210.

Palpi and antennæ black; joints of the flagellum oblong; front and vertex grayish. Thorax yellowish tawny; stripes brown, more or less shining, almost confluent; the intermediate one extends over the collare and has sometimes a pale longitudinal line in the middle; the lateral ones are extended beyond the suture; scutellum and metathorax brown; halteres infuscated, pale at the base; feet brownish, pale at the base. Abdomen brown; forceps of the male but little paler; the rostriform appendage is small and has two erect bristles; ovipositor ferruginous. Wings somewhat tinged with grayish, stigma pale gray; the tip of the auxiliary vein is nearly opposite the origin of the second longitudinal vein; the cross-vein is very near its tip (the distance is slightly

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variable); the cross-vein separating the discal cell from the first basal cell is more arcuated than usual, and hence the inner end of the discal cell is comparatively but little more distant from the basis of the wing than the inner end of the submarginal cell; discal cell closed.

Hab. Trenton Falls, N. Y.; Canada, &c.

Observation: The excision between the 4th and 5th joints of the male tarsi is hardly perceptible in this species.

11. D. liberta O. S. ♂ and ♀.—Grisea, thorace fusco-vittato, palpis et antennis nigris, stigma pallidum, juxta venulam transversam marginalem infuscatum.

Gray, thorax striped with brown, palpi and antennæ black; stigma pale, infuscated along the cross-vein. Long. corp. 0.25—0.35.

Syn. *Dicranomyia liberta* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 209.

Rostrum and palpi black; front and vertex gray; antennæ black, with hairs of moderate length. Thorax gray, almost slate color; a well-defined broad, fuscous intermediate stripe, sometimes with a pale line along its middle; lateral stripes abbreviated before and extended beyond the suture behind; scutellum slightly tawny on the margins; halteres pale, knobs dusky; feet dark tawny, pale at the base, darker brown towards the tip of the femora; tips of the tibiæ and of the tarsi brown. Abdomen blackish-gray; forceps of the male paler; its structure is like Tab. III, fig. 3. Wings hyaline, faintly tinged with gray; pale at the basis; veins brownish; a faint cloud at the root of the fourth vein; stigma oblong, pale, distinctly clouded along the marginal cross-vein; the tip of the auxiliary vein is nearly opposite the origin of the second vein (sometimes a little before or beyond it); the subcostal cross-vein is not far from its tip; discal cell closed.

In one of the specimens the discal cell is open, on one wing only. In another specimen (a female) the intermediate one of the three veins running from the discal cell to the margin, takes an oblique direction and forms a fork with the anterior one of the three veins; this is the case on both wings.

Hab. United States; seems to be common everywhere; I have collected specimens in Mobile, Ala.; Dalton, Ga.; Washington,

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D. C.; New York, etc. Wisconsin (Kennicott). The infuscated marginal cross-vein is a very good distinctive character of this species.

This species is apparently identical with a European one, a specimen of which is in my possession. I cannot determine the latter with any degree of certainty, but the description of *D. tristis* Schum. agrees tolerably well with it.

12. D. hæretica, n. sp. ♂ and ♀.—Cervina, thorace vittâ fuscâ; antennæ nigræ; rostrum ochraceum; palpi fusci; alæ cinerascentes, immaculatæ; præfurcæ initium apici venæ auxiliaris plus minusve oppositum.

Drab colored, thorax with a brown stripe; antennæ blackish, rostrum yellow, with brown palpi; wings with a grayish tinge, immaculate; the origin of the præfurca is nearly opposite the tip of the auxiliary vein. Long. corp. 0.3—0.35.

Head brownish, finely sericeous with yellowish; rostrum yellow, palpi brown; antennæ brownish-black. Thorax brownish, finely sericeous with brownish-yellow; this sericeous dust being the thickest on the sides, leaves a brown stripe in the middle; pleuræ brownish, or, in some specimens, pale; sericeous with yellowish; scutellum and metathorax brownish, likewise dusted with whitish-yellow. Stem of halteres pale towards the basis, knob brown; abdomen brown above, venter paler. The forceps of the male is rather large and conspicuous even in dry specimens; in fresh specimens the reniform lobes appear somewhat club-shaped at one end, that is, broader at the tip than in the middle; the upper valves of the ovipositor are remarkable for their extreme smallness. Coxæ and basis of the femora yellowish; feet tawny, tip of the tibiæ slightly infuscated; tarsi brown towards the tip. Wings (Tab. I, fig. 3) with a slight brownish-gray tinge, veins brown; stigma pale (slightly infuscated along the cross-vein in one of the specimens from Fort Resolution). Tip of the auxiliary vein nearly opposite the origin of the second vein; subcostal cross-vein removed from this tip at a distance a little less than the length of the great cross-vein; the marginal cross-vein is near the tip of the first longitudinal vein, and is placed in such a manner that it looks as if the first longitudinal vein was incurved towards the second and connected with the costa by the cross-

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vein, the latter being often indistinct; the submarginal cell is about one-third longer than the præfurca (this relation is, however, variable in different specimens); the seventh longitudinal vein is faintly sinuated about the middle; the position of the great cross-vein, as well as the inclination of the vein which closes the discal cell on the inside, are variable.

Hab. Environs of New York, on the salt-marshes, common. Fort Resolution, H. B. T. (Kennicott).

D. hæretica may be easily distinguished from *D. liberta* by the coloring of the thorax, the shortness of the valves of the ovipositor, the greater distance between the tip of the auxiliary vein and the cross-vein, and, in fresh specimens, by the club-shaped lobes of the male forceps. The teeth on the under side of the ungues are very small and difficult to perceive. The last tarsal joint is somewhat incrassated in the male and the interval between it and the preceding joint is excised. There is a European species, the name of which I do not know, and which closely resembles *D. hæretica.*

13. D. halterata, n. sp. ♂.—Fusca; rostrum, palpi et antennæ nigra; halteres longiusculi; alæ pallide infuscatæ, immaculatæ, stigmate obscuriore; venula transversa subcostalis ab apice venæ auxiliaris longitudine stigmatis remota.

Brownish; rostrum, palpi, and antennæ black; halteres rather long; wings tinged with pale brownish, immaculate, stigma darker; the subcostal cross-vein is removed from the tip of the auxiliary vein at a distance equal to the length of the stigma. Long. corp. 0.3.

Head brownish, somewhat sericeous with yellowish; antennæ and palpi black. Thorax dull brown, hardly shining above; humeral region sericeous with yellowish; the usual stripes confluent; pleuræ brown, sericeous with grayish below the root of the wings and that of the halteres; scutellum and metathorax brown, sericeous with gray; halteres comparatively long, infuscated, their root pale. Abdomen brown, the genitals but little paler. Feet brown, coxæ brownish-yellow; tarsi almost black. Wings tinged with pale brownish; tip of the auxiliary vein nearly opposite the origin of the præfurca; the subcostal cross-vein removed back of this tip, at a distance nearly equal to the length of the stigma; marginal cross-vein at the tip of the first longitudinal vein; discal cell closed.

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Hab. Labrador (Mr. A. S. Packard, Jr.); four male specimens.

This species will be easily distinguished from *D. hæretica* by its brown rostrum, the darker tinge of its wings and of its stigma, by the greater distance between the subcostal cross-vein and the tip of the auxiliary vein; by its unusually long halteres, and in general by its darker coloring. I can perceive a tooth at the basis of the ungues. The excision at the basis of the last tarsal joint of the male is likewise distinct.

I possess a male specimen from Canada, the halteres of which are of the same length as those of *D. halterata;* the venation and coloring of the wings are likewise the same (the stigma is slightly paler); but the thorax is brownish ochraceous, except the space on the back, usually occupied by the stripes, which is brown. Is it not a paler variety of *D. halterata*?

14. D. badia WALK. ♂ and ♀.—Fusca, abdominis fasciis pallidis; pedibus fuscis, femorum apice pallido, alis fusco-nebulosis; stigmate subquadrato, fusco.

Brown, abdomen with pale bands; feet brown, tip of the femora pale; wings clouded with brownish; stigma nearly square, brownish. Long. corp. 0.3—0.35.

SYN. *Limnobia badia* WALK., List, etc. I, p. 46.
Dicranomyia humidicola O. SACKEN, Proc. Ac. Nat. Sc. Phil. 1859, p. 210.

Rostrum, palpi, and antennæ dark brown; front and vertex grayish-brown. Thorax tawny with more or less confluent brown stripes; a faint yellowish, sericeous reflection in the humeral region; pleuræ brown, with some paler spots; halteres pale, knob infuscated; coxæ pale; feet tawny; a pale band at the tip of the femora. Abdomen tawny, with pale bands on the incisures; male forceps like Tab. III, fig. 2; ovipositor of the female ferruginous. Wings somewhat tinged with grayish and faintly clouded with brownish; a pale brown cloud at the origin of the præfurca; another, rounded one, at the inner end of the submarginal cell; the cross-veins likewise clouded; stigma brown, in the shape of an elongated square. Tip of the auxiliary vein generally a little beyond the origin of the præfurca, sometimes nearly opposite it, the cross-vein very near its tip.

Hab. Washington, D. C.; Trenton Falls; Connecticut; Canada.

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Common in damp, shady situations, especially in hollows, having a spring at the bottom.

This species can always be easily recognized by the pale band at the tip of the femora. I have found some specimens near the Sharon Springs, N. Y., without any apparent brown clouds, except the stigma; but this pale band and the other characters undoubtedly refer it here.

15. D. morioides O. S. ♂ and ♀.—Thorace nigro, nitido, pleuris argenteo-micantibus; alis pallide infuscatis, stigmato fusco.

Thorax black, shining; pleuræ with a silvery reflection; wings somewhat infuscated, stigma brownish. Long. corp. 0.3.

Syn. *Dicranomyia morio* O. Sacken (nec *Fab.*), Proc. Ac. Nat. Sc. Phil. 1859, p. 212.

Head black, front silvery; palpi and antennæ black; the last joint of the former ends in a slender, cylindrical prolongation, which might be taken for a fifteenth joint. Thorax black, shining above, silvery on the pleuræ; halteres with a blackish knob; feet pale brown, coxæ pale. Abdomen brownish, margins of the segments more or less pale. Wings pale brownish, stigma darker brown.

Hab. Trenton Falls, N. Y.

In 1859 I had identified this species with the European *D. morio* Fab. Since then I conceived some doubts about this identity (*Proc. Acad. Nat. Sci. Phila.* 1860, p. 17), but I have not had an opportunity as yet, for comparing a series of specimens from Europe and from North America. The latter seems to have somewhat darker wings, but by all means the discrepancy is hardly anything more than one of coloring. The peculiar structure of the last antennal joint has already been noticed by Meigen (Vol. VI, p. 274).

16. D. pubipennis O. S. ♂ and ♀.—Obscure brunnea; alis immaculatis, in regione apicali sparse pubescentibus; stigmate pallide infuscato; venâ longitudinali primâ in secundam (non in costam) incurvâ; vena auxiliari pone præfurcæ initium extensâ.

Dark brown; wings immaculate, sparsely pubescent in the apical region; stigma pale brownish; the first longitudinal vein is incurved towards the second (and not towards the costa); the auxiliary vein is prolonged beyond the origin of the præfurca (Tab. I, fig. 2). Long. corp. 0.35—0.38.

Syn. *Dicranomyia pubipennis* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 211.

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Head dark brown, antennæ and palpi black. Thorax dark brown, moderately shining and slightly pruinose with grayish above; stripes not distinct; some parts of the pleuræ and of the posterior portion of the thorax are reddish or yellowish-brown. Halteres with an infuscated knob; feet dark brown, femora tawny, paler at the basis; coxæ brownish-yellow. Abdomen brown; forceps paler; the upper valves of the ovipositor are very narrow, pointed, and nearly straight. Wings (Tab. I, fig. 2) immaculate, somewhat tinged with grayish; stigma elliptical, pale brownish; the apex of the wing is finely and sparsely pubescent; in the marginal cell this pubescence begins a little before the stigma, and it occupies nearly the whole of the submarginal, posterior, and discal cells. The tip of the auxiliary vein is about one length of the stigma beyond the origin of the second longitudinal vein; the subcostal cross-vein is near its tip. The first longitudinal vein ends in the second, forming a regular arc of a circle; the cross-vein connects it with the costa. The discal cell of this species is often open (among twenty specimens caught by me in 1859 in the same locality, five had it open), and in such specimens, it is the *anterior* branch (and not the *posterior* one as usual) of the fourth longitudinal vein which is forked; in other words, the discal cell coalesces with the third, and not with the second posterior cell.

Hab. Washington, D. C., not rare in April and May; also further north.

The pubescence in the apical portion of the wing, as well as the forking of the anterior, instead of the posterior branch of the fourth vein are very good distinctive characters of this species.

17. D. globithorax, n. sp. ♂ and ♀.—Brunnea, capite antennisque nigro-fuscis, thorace gibbo; alis brevioribus, pallide infuscatis, immaculatis, stigmatis vestigio nullo; venâ longitudinali primâ in secundam (non in costam) incurvâ; venâ auxiliari pone præfurcæ initium extensâ.

Brown, head and antennæ brownish-black; thorax gibbous, wings rather short, slightly tinged with brownish, without spots; no vestige of a stigma; the first longitudinal vein is curved towards the second (not towards the costa); auxiliary vein prolonged beyond the origin of the præfurca. Long. corp. 0.2—0.22.

Head, including the palpi, brownish-black; joints of the flagellum short, subglobular, with a short, scattered pubescence.

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Thorax strikingly gibbous, rising abruptly over the head; it is brown, almost opaque above, without distinct stripes; more tawny on the sides and posteriorly; halteres infuscated; feet brownish; coxæ and base of the femora pale; abdomen, including the male genitals, fuscous; ovipositor rather short; upper valves distinctly curved. Wings comparatively shorter and broader than in the related species, with a slight brownish tinge; no perceptible vestige of a stigma. The first longitudinal vein, instead of ending in the costa, is curved at its tip towards the second longitudinal vein and ends in it; thus the cross-vein is apparently placed between the first longitudinal vein and the costa; the tip of the auxiliary vein, with the subcostal cross-vein close by it, is nearly opposite the middle of the præfurca; the submarginal cell is not quite one-third longer than the first posterior; first and second basal cells of equal length.

I possess two specimens, a male from the White Mountains and a female from Washington, D. C.

This species will be very easily recognized by its gibbous thorax and the total absence of a stigma. One of my specimens has the discal cell closed, the other open; thus I am in doubts, what is the rule and what the exception.

18. D. rara, n. sp. ♀.—Brunnea, capite antennisque nigris; alis apud costam maculis tribus fuscis, quartâ ad apicem minore; venâ auxiliari pone præfurcæ initium longe extensâ.

Brown, head and antennæ black; wings with three brown spots near the costa; a fourth, smaller spot near the apex of the wing; auxiliary vein prolonged far beyond the origin of the præfurca. Long. corp. 0.23.

Head, including the rostrum and the palpi, black; antennæ black. Thorax pale brownish, with three darker stripes above; a conspicuous dark brown stripe runs from the collare across the pleuræ towards the metathorax; brown spots on the sternum, between the fore and the intermediate coxæ; halteres infuscated; abdomen brown, segments paler at the basis; ovipositor subferruginous; coxæ and femora pale tawny; the latter with a brown band before the tip; knees pale; tibiæ and tarsi brownish. Wings distinctly infuscated; a brown spot (sometimes preceded by a pale streak) at the origin of the second vein; a smaller one at the tip of the auxiliary vein; a rounded brown spot, included between two whitish ones, at the tip of the first longitudinal

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vein; a smaller one at the tip of the second longitudinal vein; cross-veins infuscated, as well as the tips of all the other longitudinal veins. Subcostal cross-vein at the tip of the auxiliary vein, which is distinctly beyond the middle of the præfurca; marginal cross-vein very near the tip of the first longitudinal vein; second basal cell a little shorter than the first.

Hab. New York; two female specimens.

19. D. defuncta O. S. ♂ and ♀.—Fusco-cinerea, thorace vittis tribus nigro-fuscis, intermediâ duplice; pedes nigro-fusci, femora apicem versus annulo albido: alæ in cellulis omnibus seriatim fusco-maculatæ et punctatæ; venâ auxiliari pone præfurcæ initium modice extensâ.

Brownish-gray, thorax with three brown stripes, the intermediate double; feet blackish-brown, femora with a whitish ring towards the apex; wings with brown spots and dots arranged in rows in all the cells; the auxiliary vein is somewhat prolonged beyond the origin of the præfurca. Long. corp. 0.35—0.4.

Syn. *Dicranomyia defuncta* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 213.

Head cinereous, front and vertex almost black in the middle; rostrum, palpi, and antennæ fuscous; joints of the flagellum subglobular, with short verticils. Thorax cinereous with three brown stripes, the intermediate one divided in two by a pale longitudinal line; pleuræ variegated with brown; halteres pale with black knobs; coxæ cinereous, feet brown, base of the femora tawny; a very distinct whitish ring at a distance equal to its own width, from the tip of the femora. Abdomen blackish cinereous; posterior margins of the segments paler; genitals pale. Wings with a grayish tinge, spotted with blackish-brown; subcostal cell infuscated at four intervals; several spots, forming a short transverse band, along the central cross-veins; series of small, round dots along the middle of the cells; a larger spot at the tip of the seventh longitudinal vein; stigma square.

Hab. Washington, D. C.; Trenton Falls; Maine; Canada. I have often found it alighting on rocks and stones over which a thin sheet of water was running.

The forceps of this species (Tab. III, fig. 1 and 1*a*) has more elongated, slender lobes than the typical *Dicranomyiæ;* no rostriform horny appendage is apparent. The ungues are large and have several notches on the under side, instead of the teeth, which characterize the *Limnobina.* The excision on the under

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side at the basis of the last tarsal joint of the male is distinct, although small.

The following species from California is not included in the dichotomical table of page 60.

20. D. marmorata O. S. ♂.—Cinereo-fusca, thorace vittis tribus fuscis; alis cinereo-nebulosis, stigmate quadrangulari, fusco; femorum apicibus infuscatis.

Grayish-brown, thorax with three brown stripes; wings clouded with cinereous; stigma quadrangular, brown; tip of the femora brown. Long. corp. 0.4.

Syn. *Dicranomyia marmorata* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1861, p. 288.

Rostrum, palpi, and antennæ brown; joints of the latter subglobular, verticils short; front and vertex cinereous, darker in the middle; thorax cinereous, with three brown stripes; abdomen brownish cinereous, posterior margins of the segments pale; halteres pale; feet yellowish, tips of femora, of the tibiæ, and of the tarsi brown; wings subcinereous with some darker clouds and some hyaline bands and spots; a cloud at the origin of the præfurca, another, round one, at its tip; cross-veins also clouded; stigma obscure-cinereous, elongated, quadrangular; the hyaline spots are arranged in the following way: a small, rounded one in the anal angle; a band running across the basal portion of the two basal and the anal cells, and ending in the spurious cell near the posterior margin; a spot near the tip of the seventh longitudinal vein; a large irregular hyaline space in the central portion of the wing, inclosing the stigma and the two clouds of the præfurca, and extending more or less towards the posterior margin, across the discal and the posterior cells; its outline is very indefinite, and it is interrupted by clouded marks along the veins; a small hyaline mark at the tip of the wing, in the submarginal cell. The tip of the auxiliary vein almost corresponds to the origin of the præfurca; the subcostal cross-vein is a short distance before its tip; the discal cell is present (closed), and the great cross-vein corresponds to its base.

Hab. California; two male specimens (Mr. A. Agassiz). This species is related to *D. humidicola* O. S.

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Gen. II. GERANOMYIA.

One submarginal cell; four posterior cells; a discal cell. Antennæ 14-jointed, submoniliform; joints not pedicelled. *Rostrum and proboscis prolonged*, longer than the head and thorax taken together; the short palpi are inserted about their middle. Feet slender; tibiæ without spurs at the tip; empodia indistinct or none; ungues with teeth on the under side. The forceps of the male is like that of *Dicranomyia*, and consists of two fleshy, movable lobes, with horny appendages and a horny style under them.

This genus is most closely allied to *Dicranomyia*, and is distinguished from it only by the enormously developed oral parts. These consist of a very long, subcylindrical epistoma, a still longer lingua, which is slender and pointed, and a labium divided in two branches at the tip, terminated by slender, flattened lobes; these branches are divergent and sometimes curled up in dry specimens. The short palpi (bi-articulate according to Mr. Curtis) are inserted about the middle of the proboscis to the anterior angles of the rostrum. This proboscis is principally used for sucking moisture and flowers.

Mr. Haliday (*Entomol. Magaz.* I, p. 154) described this genus in 1833, establishing it upon *G. unicolor*, a species found on the rocks and shrubs near the sea-shore in England and Ireland.

Mr. Curtis (*Brit. Entom.* 573, 1835) gave a beautiful plate and a description of this genus, which he very correctly distinguishes from *Rhamphidia*, by stating that the latter has 16- and not 14-jointed antennæ, and a rostrum of a different structure. The structure of the proboscis of *Geranomyia*, subjected to a careful dissection, is represented on the plate (the figure is reproduced in Walker's *Ins. Brit. Dipt.* III, Tab. XXVII, fig. 6, *a*, *b*). The second species, described by Mr. Curtis (*G. maculipennis*) was considered by later authors as a variety of *G. unicolor* (comp. Walker, l. c. 310).

G. unicolor has hitherto been found only in England; a second European species has been discovered in Austria and also called *G. maculipennis* (*Verh. Zool. Bot. Ges. in Wien*, 1864).

Macquart (*Dipt. Exot.* I, p. 62, 1838) described the same genus under the new generic name of *Aporosa;* he introduces two species, one from the Canary Islands, the other from Isle Bourbon. But the American continent seems to be much more abundant in *Geranomyiæ*. Mr. Loew (*Linn. Entom.* Vol. V, p. 394) pub-

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lished six species from Brazil, Chile, and the West Indies; Mr. Walker (*List*, etc. Vol. I), one from Jamaica and (*Dipt. Saund.* pt. V) one from Brazil; Dr. Philippi (*Verh. Zool. Bot. Ges. in Wien*, 1865, p. 597, Tab. XXIII, fig. 1) described four species from Chile under the new generic name of *Plettusa;* Mr. Bellardi (*Saggio*, etc. *Appendice*, p. 2) one from Mexico. As three species from the United States have been described below, this makes a total of twenty species, only four of which belong to the old world.

Macquart's *Aporosa* and Philippi's *Plettusa* being identical with *Geranomyia* and posterior to it in point of time, have to be given up as generic names.

The name *Geranomyia* is derived from γέρανος, a crane, and μυῖα, a fly.

Table for determining the species.

1 { Wings spotted. 1 **rostrata** *Say.*
{ Wings not spotted. 2

2 { The auxiliary vein ends in the costa nearly opposite the origin of the præfurca. 2 **diversa** *O. S.*
{ The auxiliary vein ends in the costa far beyond the origin of the præfurca. 3 **canadensis** *Westw.*

Description of the species.

1. G. rostrata Say. ♂ and ♀.—Alis fusco-maculatis et nebulosis.

Wings with brown spots and clouds. Long. corp. 0.3.

Syn. *Limnobia rostrata* Say, Journ. Acad. Nat. Sc. Phil. III, p. 22, 6.—Wied. Auss. Zw. I, p. 35, 20.
Geranomyia rostrata O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 207.

Front and vertex gray; proboscis and antennæ black. Thorax grayish, often with a yellowish or brownish tinge; three more or less distinct brown stripes; pleuræ with a hoary bloom; scutellum and metathorax brownish, with a grayish bloom; halteres with a dark brown knob; feet tawny, tips of the tibiæ black, subclavate in appearance; tips of the tarsi infuscated. Abdomen brown, venter paler. Wings with five brown spots along the anterior margin; the cross-veins and the tips of all the veins along the apex and along the posterior margin are clouded with pale brown.

Hab. Washington, D. C.; New York; Massachusetts; Illinois; Canada. I have brought home a specimen from Cuba, which I

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believe to be the same species. It shows some slight differences, the most striking of which is, that the brown spot at the tip of the first longitudinal vein is limited posteriorly by the second longitudinal vein; whereas in my North American specimens, it crosses this vein and invades the inner end of the submarginal cell.

2. G. diversa O. S. ♂ and ♀.—Thorace cinereo, vittis tribus obscure fuscis; venæ auxiliaris apice præfurcæ initio plus minusve opposito.

Thorax gray, with three dark brown stripes; the tip of the auxiliary vein is nearly opposite the origin of the præfurca. Long. corp. 0.25—0.28.

Syn. *Geranomyia diversa* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 207.

Proboscis, palpi, and antennæ black; front and vertex grayish. Thorax with a grayish bloom above and with three well marked dark brown stripes; pleuræ, scutellum and metathorax hoary, their ground color brownish; halteres with a brown knob; feet tawny, coxæ and basis of the femora paler. Abdomen brown; male forceps paler. Wings slightly tinged with brownish; stigma very slightly darker; a slight, hardly perceptible nebulosity at the origin of the præfurca; the marginal cross-vein forms an obtuse angle, sometimes nearly a straight line, with the tip of the first longitudinal vein; the tip of the auxiliary vein is opposite the origin of the præfurca.

Hab. Trenton Falls, N. Y.

The proboscis of this species is much shorter than that of the two other species. The male of *Limnobiorhynchus braziliensis* Westw. (*Ann. Soc. Ent. de Fr.* 1835, p. 683) is a *Geranomyia*, which is not unlike *G. diversa;* the stripes of the thorax are likewise narrow and dark, and the position of the marginal cross-vein is the same. I have seen the specimen in Mr. Westwood's collection, without having subjected it to a close comparison with *G. diversa.*

3. G. canadensis Westw. ♂ and ♀.—Thorace pallide fusco, vittis tribus obscurioribus; venâ auxiliari pone præfurcæ initium extensâ.

Thorax pale brown, with three darker stripes; auxiliary vein extended beyond the origin of the præfurca. Long. corp. 0.25—0.28.

Syn. *Limnobiorhynchus canadensis* Westw. Ann. Soc. Entom. de Fr. 1835, p. 683.

Geranomyia communis O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 207.

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Head tawny, somewhat grayish on the front; antennæ blackish, under side of the first joint tawny; proboscis and palpi brown, the former paler at the basis. Thorax brownish, with three more or less dark brown stripes; pleuræ paler; metathorax brownish, with a hoary bloom; halteres infuscated, pale at the basis; feet tawny, tips of the femora, of the tibiæ, and of the tarsi brown. Abdomen brown, posterior margins of the segments paler; venter pale. Wings very slightly tinged; stigma brownish; the tip of the first longitudinal vein is incurved towards the second, the marginal cross-vein being apparently between it and the costa; the tip of the auxiliary vein is nearly opposite the middle of the præfurca.

Hab. Washington, D. C.; Upper Wisconsin River (Kennicott); Illinois (LeBaron).

The proboscis of this species is very long, at least once and a half the length of the thorax. I have seen the original specimen of *Limnobiorhynchus canadensis* Westwood, in the author's own collection; (compare the genus *Toxorrhina.*)

Gen. III. RHIPIDIA.

One submarginal cell; four posterior cells; a discal cell. Antennæ 14-jointed; *bipectinate, pectinate or subpectinate;* joints of the flagellum always distinctly pedicelled. Rostrum and proboscis short. Feet slender; tibiæ without spurs at the tip; empodia indistinct or none. The forceps of the male is like that of *Dicranomyia* and consists of two immovable, fleshy lobes, and a horny style on the under side (Tab. III, fig. 5 and 5*a*).

Rhipidia is principally distinguished from *Dicranomyia* by the structure of the antennæ. This structure is most prominent and peculiar in the male of *R. maculata* M.; the joints of the flagellum (except the basal and the terminal ones) emit in this species two, rather long, branches. In the two other North American species and in the second European species (*R. uniseriata* Schin.) the joints of the flagellum bear only a single branch, which is shorter than those of *R. maculata.* The females of all the species have a moniliform flagellum, that is, the single joints are separated by distinct pedicels; the joints of the basal half of the flagellum are somewhat projecting on the under side.

The auxiliary vein reaches more or less beyond the origin of the second longitudinal vein, and in this respect *Rhipidia* agrees with those North American *Dicranomyiæ,* which have spotted

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wings (*D. rara, defuncta*). The subcostal cross-vein in all the species known to me, is close by the tip of the auxiliary vein; the marginal cross-vein close by the tip of the first longitudinal vein. The slenderness of the feet, the structure of the forceps of the male, etc., remind one of *Dicranomyia* (compare the forceps of *R. maculata*, figured by me in *Stett. Ent. Z.* 1854, Tab. I, fig. 3, and that of *R. domestica* in the present volume, Tab. III, fig. 5, 5*a*).

The genus *Rhipidia* (from ῥιπίς, a fan) was established by Meigen, in 1818, for the only European species at that time known. A second European species, *R. uniseriata*, has been only very recently (1864) described by Dr. Schiner. Among the three North American species, one occurs also in Europe; the other is very like the European *R. uniseriata*, and the third seems to be common to the United States and to Brazil. A *Rhipidia* from Caffraria exists in the Berlin Museum.

Table for the determination of the species.

1	Wings with spots and clouds scattered over the whole surface.	1 **maculata** *M.*
	Wings with some brown spots or clouds along the anterior margin only.	2
2	Antennæ black.	2 **fidelis** *O. S.*
	Antennæ with the two penultimate joints yellow.	3 **domestica** *O. S.*

Description of the species.

1. R. maculata M. ♂ and ♀.—Cinereo-fusca, thoracis vittâ brunneâ, alæ maculis majoribus in margine antico, punctis et maculis minoribus in cellulis omnibus, fuscis; antennæ maris bipectinatæ.

Grayish-brown, thorax with a brown stripe; wings with larger brown spots along the anterior margin and with smaller spots and dots in all the cells; antennæ of the male bipectinate. Long. corp. 0.3—0.4.

Syn. *Rhipidia maculata* Meigen, I, p. 153; Tab. V, fig. 9–11.—O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 208.

Front and vertex gray; rostrum, palpi, and antennæ black; joints of the flagellum (except the basal and the terminal ones) bipectinate in the male; in the female, these joints project distinctly on the under side. Thorax brownish, pruinose with gray above; a broad brown stripe in the middle; lateral stripes somewhat indistinct; halteres pale; feet tawny; coxæ and base of the

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femora pale; tip of the latter and of the tibiæ brown. Abdomen brown. Wings with a grayish tinge, densely covered with pale brown spots and smaller dots; several larger spots along the anterior margin; numerous dots in all the cells; cross-veins clouded.

Hab. Europe and North America; principally the northern regions of the latter. White Mountains, N. H.; Trenton Falls, N. Y.; Washington, D. C.; Maine (Packard); Hudson's Bay Territory (Kennicott); Illinois (id.). This insect occurs twice in the year, in the spring and in autumn; it is more rare towards the south.

A female specimen in my possession has the spots along the anterior margin larger and the nebulosities on the cross-veins darker; the smaller dots in the cells, on the contrary, are not so dense as usual, leaving large hyaline intervals between them.

2. R. fidelis O. S. ♂ and ♀.—Cinereo-fusca, thoracis vittâ brunneâ; alis in margine anteriore fusco-nebulosis; antennæ maris unipectinatæ.

Grayish-brown; thorax with a brown stripe; wings with brownish clouds along the anterior margin; antennæ of the male unipectinate. Long. corp. 0.3.

Syn. *Rhipidia fidelis* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 209.

Rostrum, palpi, and antennæ blackish; the flagellum of the latter (beginning with its second joint) is short unipectinate in the male, and only moniliform in the female; thorax brownish, pruinose with gray above, a broad brown stripe in the middle; lateral stripes less distinct. Halteres pale; feet brownish, femora pale at the basis, darker at tip. Abdomen brown; male genitals paler. Wings with a pale brownish tinge, excepting a large whitish region, embracing the præfurca and the stigma; in this region, however, the stigma itself, a round spot at the origin of the præfurca, another one at the inner end of the submarginal cell, and a small dot at the tip of the auxiliary vein are brown; a narrow margin along the apex of the wing is likewise whitish.

Hab. Sharon Springs, N. Y.; Illinois. I possess only two specimens.

The European *R. uniseriata* Schin. is remarkably like this species, but the apex of the wings is altogether dark.

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3. R. domestica O. S. ♂ and ♀.—Antennæ nigræ, articulis flagelli reniformibus, subpectinatis; pænultimo et antepænultimo flavis.

Antennæ brown, joints of the flagellum reniform, subpectinate; the penultimate and antepenultimate joints yellow. Long. corp. 0.3—0.35.

Syn. *Rhipidia domestica* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 208.

Front and vertex cinereous; rostrum and palpi brown; eyes almost contiguous; in living specimens dark green above and purple below; antennæ black; penultimate and antipenultimate joints yellow; flagellum moniliform; its joints reniform. Thorax yellowish-brown, sericeous, when viewed in a certain light; the thoracic stripes (a double intermediate one and broad lateral ones) occupy the posterior part of the mesonotum; the anterior part shows a brown line in the middle, which is expanded in front, and several brown dots on the humeri; two brown stripes on the pleuræ, one running from the collare, backwards; the other along the base of the coxæ. Halteres tawny, with a dusky spot on the knob; feet tawny; coxæ and basis of the femora pale; tips of the femora, of the tibiæ, and of the tarsi brown. Abdomen brownish; lateral margins of the segments darker; forceps tawny (Tab. III, fig. 5 and 5 *a*). Wings tinged with pale brownish; first and fifth longitudinal veins yellowish; the others brownish; five brown spots along the first longitudinal vein, more or less expanded on both sides of this vein in the shape of clouds; the third spot (counting from the root of the wing) is connected with a cloud at the origin of the præfurca; the fifth is a round spot at the tip of the first longitudinal vein; it is connected with a cloud, surrounding the stigma, the centre of which is pale; a pale cloud at the inner end of the submarginal cell; tips of all the longitudinal veins and all the cross-veins clouded; pale, indistinct clouds in some of the cells.

Hab. Washington, D. C., not rare; Palisades, New Jersey. I have seen in the Berlin Museum a specimen from Brazil, which I believe to be the same species.

Gen. IV. LIMNOBIA.

One submarginal cell; four posterior cells; a discal cell. The marginal cross-vein is sometimes at the tip of the first longitudinal vein, but often at some distance anterior to this tip, crossing the stigma; the tip of the auxiliary vein is usually far beyond the origin of the præfurca. Antennæ

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14- (often apparently 15-) jointed. Feet comparatively strong; tibiæ without spurs at the tip; empodia indistinct or none; ungues with several teeth on the under side, giving them a pectinate appearance. The forceps of the male consists of two horny, movable hooks, and a horny style under them (Tab. III, fig. 6 and 7).

This genus is closely allied to *Dicranomyia*, but can be easily distinguished by the structure of the forceps of the male, and, in most cases, by the greater length of the auxiliary vein, which extends far beyond the origin of the præfurca and ends nearly opposite the inner end of the submarginal cell. The European *L. macrostigma* is the only species I know of, the auxiliary vein of which extends but very little beyond the origin of the præfurca; but the marginal cross-vein of this species is situated about the middle of the stigma and at some distance from the tip of the first longitudinal vein, which is never the case among the *Dicranomyiæ*.

The first longitudinal vein of *Limnobia* is generally also longer than that of *Dicranomyia;* its tip is usually nearly opposite the middle of the submarginal cell; sometimes (as in *L. parietina*) far beyond the middle. The discal cell is closed in all the species which I have had occasion to examine. The marginal cross-vein is either at the tip of the first longitudinal vein, or at some distance from the tip. In the first case it often occurs that the first longitudinal vein appears incurved towards the second, and that the cross-vein seems to be placed between it and the costa (this same structure occurs among the *Dicranomyiæ*). A more detailed comparison between the venation of *Limnobia* and *Dicranomyia* has been given above on page 57.

The *Limnobiæ* are generally larger and more strongly built than the *Dicranomyiæ;* their rostrum and palpi are somewhat longer; the joints of the flagellum more elongated, especially towards the tip; the verticils longer; the feet stouter, often more hairy; but all these characters are not of an absolute value.

The ungues of *Limnobia* have several distinct, and very striking teeth on the under side, which give them a pectinate appearance; in some species they reach to the middle of the unguis, in others they extend almost to the end.

The colors of the *Limnobiæ* are for the most part bright and striking, with well defined stripes on the thorax, bands on the

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feet, and spots on the wings; they form, in this respect, a contrast with the usually dull coloring of the *Dicranomyiæ*.

The last antennal joint of this genus often shows a cylindrical prolongation, sometimes slightly clavate at the tip, which, even in living specimens, looks like a fifteenth joint. That this is not a real joint seems to be proved by the circumstance that closely allied species differ with regard to its structure; one species may appear to have 15-jointed antennæ, whereas in the next one only 14 joints can be counted.

The larvæ of this genus live in decaying vegetable matter, especially in wood and fungi. Stannius (*Beiträge*, etc. p. 202) found the larva of *Limnobia xanthoptera* (a species related to the North American *L. triocellata*) in an *Agaricus;* the larva was wrapped in a sheath of earthy matter, rough on the outside, smooth and shiny on the inside; it went underground for transformation. Van Roser (*Verz. Würt. Dipt.*) discovered the larvæ of *L. annulus* (closely allied to *L. cinctipes* Say) in decayed wood; they are like an earth-worm in size, as well as in color, and line their burrows with a kind of silken web.

Limnobia may be subdivided in two groups, defined by the position of the marginal cross-vein.

The first group, having the cross-vein close by the tip of the first longitudinal vein, contains large, very characteristic species, the typical *Limnobiæ*. A remarkable parallelism exists in this group, between the species from Europe and from North America. *L. annulus* Lin. is closely allied to *L. cinctipes* Say; *L. quadrinotata* Meig. is analogous to *L. solitaria;* and *L. xanthoptera*, although belonging to a somewhat different type, is represented in North America by *L. triocellata*.

In the second group, the marginal cross-vein is at some listance from the end of the first longitudinal vein, and more or less approximated to the middle of the stigma. The ovipositor of the females of this group is more long, slender and pointed than the ovipositor in the first group; the short, curved shape of the latter being more like the ovipositor of *Dicranomyia*. Four North American species belong to this group, two of which have clouded, and the two others almost immaculate wings. In Europe, this group is more abundantly represented, and there is a number of handsome species with more or less pictured and clouded wings, which, as far as known, have no representatives in North America

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(such are the European *L. flavipes* Meig., *nubeculosa* M., *sylvicola* Schum., *nigropunctata* Schum. etc.).

The name *Limnobia* (from λίμνη, lake, swamp, and βιόω, I live), as originally introduced by Meigen (1818), embraced all the brevipalpous *Tipulidæ*, with the exclusion of *Erioptera*, *Anisomera*, *Trichocera*, and *Rhipidia*. Macquart afterwards confined it to the species with four posterior cells. The genus, in its present limitation, dates from the time of the separation of *Dicranomyia* by Stephens in 1829; it has continued, however, in the principal works published since (especially those of Zetterstedt and Walker), to be received in Meigen's wide acceptation. My definition of *Limnobia*, in 1859, was coincident with the whole section *Limnobina; Rhipidia, Geranomyia, Dicranomyia*, and *Limnobia*, in the narrowest sense, were treated as subgenera.

Table for determining the species.

1 { The marginal cross-vein is at the tip of the first longitudinal vein.[1] 2
  { The marginal cross-vein is some distance back of the tip of the first longitudinal vein. 6

2 { Femora with one or more brown bands before the tip. 3
  { Femora without brown bands, brown at the tip only. 5 **triocellata** *O. S.*

3 { Knob of the halteres pale at the tip. 4
  { Knob of the halteres altogether infuscated. 5

4 { Femora with two brown bands and a pale band between them; a ring-like spot at the end of the first longitudinal vein. 1 **cinctipes** *Say.*
  { Femora with three brown bands and two pale ones between them; the brown spot at the tip of the first longitudinal vein is entire, not ring-like. 2 **immatura** *O. S.*

5 { A series of more or less numerous (from two to eight) brown dots along the first basal cell. 3 **solitaria** *O. S.*
  { Four large, dark, almost equidistant brown spots in the first basal cell. 4 **hudsonica** *O. S.*

6 { Wings clouded with brown. 7
  { Wings immaculate (or with a few small brown dots near the anterior margin only). 8

7 { Posterior cells clouded in the middle. 6 **parietina** *O. S.*
  { Posterior cells not clouded in the middle. 7 **indigena** *O. S.*

[1] Whenever the structure occurs that the first longitudinal vein is incurved towards the second, whereas the cross-vein seems to be placed between it and the costa, the cross-vein is to be considered as being at the tip of the first longitudinal vein.

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8 { Wings with pale brown dots at the tip of the auxiliary vein, the origin of the præfurca, and at both ends of the stigma. 8 **tristigma** *O. S.*
Wings entirely immaculate. 9 **sociabilis**, n. sp.

Description of the species.

1. L. cinctipes Say. ♂ and ♀.—Thoracis vittis quatuor, femorum annulis duobus fuscis; halterum capitulo pallido, ad basin fusco; alæ fusco-maculatæ et nebulosæ; venula transversalis marginalis juxta apicem venæ longitudinalis primæ sita,[1] ocello fusco inclusa.

Thorax with four brown stripes, femora with two brown bands; halteres with a pale knob, which is infuscated at the basis; wings spotted and clouded with brown; the marginal cross-vein is at the tip of the first longitudinal vein; a brown, ring-like spot passes over it. Long. corp. 0.5—0.6.

Syn. *Limnobia cinctipes* Say, Journ. Ac. Nat. Sc. Phil. III, 21, 4.—Wiedemann, Auss. Zw. I, 32, 15.—O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 214.

Rostrum and palpi infuscated; antennæ brown, more or less ferruginous at the basis (usually the first three joints); front yellowish-cinereous; vertex with a large brown spot, divided in two by a yellow line. Thorax yellow with four dark brown stripes; the intermediate ones separated by a narrow yellow line; in well-preserved specimens, these stripes are covered with a grayish bloom, except in the middle of the intermediate ones and at the anterior end of the lateral ones, where the color is velvety-black; humeri yellow, with a small brown dot; the remaining portions of the thorax are yellow, more or less spotted with brown; halteres pale, with a brown spot at the basis of the knob; feet yellow; femora with two brown bands before the tip, which is yellow; tarsi infuscated beyond the tip of the first joint. Abdomen ferruginous-yellow, with brown bands across the posterior half of the segments; the bands on the anterior segments interrupted; venter darker towards the tip in the male; genitals pale ferruginous. Wings somewhat yellowish, with brown spots and clouds; four spots along the anterior margin; the first at the inner end of the basal cells; the second at the origin of the præ-

[1] The structure where the first longitudinal vein is incurved towards the second and the cross-vein is apparently placed between it and the costa, generally occurs in this species and the four following; this cannot prevent us from considering the cross-vein as being at the tip of the first vein.

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furca; the third, double spot, at the tip of the auxiliary vein and at the inner end of the submarginal cell; the fourth, ring-like one, at the tip of the first longitudinal vein; cross-veins infuscated; a pale brown band crosses the cells of the apical portion of the wing; several irregular pale brown clouds in the cells along the posterior margin, leaving some pellucid spots alongside of the margin.

Hab. Missouri (Say); Washington, D. C., end of April; Illinois (Kennicott); Massachusetts (Scudder).

In general appearance this species is very like the European *L. annulus* Lin.; but there are unmistakable differences in the details. My female specimen shows no brown bands on the abdominal segments; this is undoubtedly accidental, as Wiedemann, in describing a female, mentions them.

2. L. immatura O. S. ♂ and ♀.—Thoracis vittis quatuor, femora annulis tribus fuscis; halterum capitulo apice pallido; alæ fusco-maculatæ et nebulosæ, venula transversalis marginalis juxta apicem venæ longitudinalis primæ sita, maculâ fuscâ integrâ inclusa.

Thorax with four brown stripes, femora with three brown bands; the knob of the halteres is pale at the tip; wings spotted and clouded with brown; the marginal cross-vein is at the tip of the first longitudinal vein and is included in a brown, entire (not ring-like) spot. Long. corp. 0.4—0.5.

Syn. *Limnobia immatura* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 214.

Very like the preceding species, but showing the following differences: it is smaller in size; the femora, besides the two brown bands *beyond* the middle, have a third one *in* the middle; it is pale, although distinct, especially on the anterior pair; the lateral edges of the abdomen are black, but there are no black stripes on the posterior portion of the segments; the spot at the tip of the first longitudinal vein is entire, not ring-like; the gray band at the tip of the wing and the diluted clouds along the posterior margin are much darker; on the humeri there is a large subtriangular brown spot, almost occupying the whole space which is yellow in *L. cinctipes;* the pleuræ are darker; the basis and the tip of the halteres are pale, the whole intermediate space being dusky.

Hab. Washington, D. C., in May; Upper Wisconsin River (Kennicott); Maine (Packard).

In this species, the fork formed by the subcostal cross-vein with

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the tip of the auxiliary vein, usually has the posterior branch (ending in the first longitudinal vein) distinctly longer than the anterior one (ending in the costa).

3. L. solitaria O. S. ♂ and ♀.—Thorax vittâ mediâ pallidâ, fusco marginatâ; halterum capitulo infuscato; alæ fusco-maculatæ et nebulosæ, in cellulâ basali primâ serie punctorum fuscorum; venula transversalis marginalis juxta apicem venæ longitudinalis primæ sita.

Thorax with a pale intermediate stripe, margined with brown; knob of the halteres infuscated; wings spotted and clouded with brown; a series of brown dots in the first basal cell; the marginal cross-vein at the tip of the first longitudinal vein. Long. corp. 0.4—0.5.

SYN. *Limnobia solitaria* O. SACKEN, Proc. Ac. Nat. Sc. Phil. 1859, p. 215.

Rostrum and palpi infuscated; front with a yellowish cinereous reflection; vertex infuscated, with a yellow line in the middle; antennæ brown; first joint yellow; the two or three following yellowish at the basis, infuscated at the tip. Thorax yellow; in the middle a pale yellowish stripe margined with brown; these brown margins are more or less broad, so as to invade sometimes nearly the whole stripe, except a yellowish line in the middle; two lateral brown stripes, extended beyond the suture behind; scutellum and metathorax pale yellowish, sericeous, both with lateral brown spots; halteres with brown knobs; femora with a brown band at the tip, preceded by a pale one; tibiæ and tarsi yellowish tawny, the former infuscated at the tip, the latter beyond the tip of the first joint. Abdomen yellowish-ferruginous; an indistinct brown band, formed by a series of spots, in the middle of the back; genitals pale; male forceps like Tab. III, fig. 6; the ovipositor has the horny transverse piece, to which the upper valves are fastened, very broad and stout; this causes the basal portion of the valves to appear more divergent. Wings yellowish, with brown spots and clouds; an oblique spot extends from the inner end of the stigma to the inner end of the submarginal cell; the posterior end of the stigma is likewise infuscated; a series of brown dots begins with one at the inner corner of the first basal cell and extends more or less far along the middle of this cell; they are more or less numerous; sometimes eight or nine, reaching the inner end of the submarginal cell, sometimes only two or three at the inner end of the basal cell; the spot nearest to the cloud at the origin of the præfurca is often the

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largest of them; there is a pale brownish band across the apical portion of the wing and some clouds along the posterior margin.

Hab. Trenton Falls, N. Y.; White Mountains, N. H.; Maine (Packard); northwestern regions of the Hudson's Bay Territory (Kennicott).

In the five male specimens which I have before me, the auxiliary vein ends in the costa a little beyond the inner end of the stigma, and the cross-vein is somewhat anterior to the tip of this vein. Thus, the fork formed by them has its anterior branch longer than the posterior one (the opposite is the case in most specimens of *L. immatura*). The two female specimens in my possession do not show these characters; both branches of the fork, above alluded to, are of the same length, and the anterior one does not reach beyond the inner end of the stigma.

4. L. hudsonica O. S. ♀.—Thorax vittis quatuor; halteres capitulo fusco; alæ fusco-maculatæ et nebulosæ; maculis obscure fuscis; in cellulâ basali primâ maculæ quatuor magnæ, fere æquidistantes; venula transversa marginalis juxta apicem venæ longitudinalis primæ sita.

Thorax with four brown stripes; knob of the halteres brown; wings with brown spots and clouds; the spots dark brown; the first basal cell contains four large, nearly equidistant spots; the marginal cross-vein is at the tip of the first longitudinal vein. Long. corp. 0.5.

Syn. *Limnobia hudsonica* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1861, p. 289.

Head blackish above, with a cinereous bloom; vertex with a yellow line in the middle; rostrum and palpi brown; antennæ brown; first joint yellowish-ferruginous; the two following likewise, but more or less marked with brown. Thorax brownish-yellow, with four brown stripes; the intermediate ones are separated by a yellowish line, which is gradually widened anteriorly; pleuræ mixed with yellowish and brown; halteres with a brown knob. Abdomen reddish-yellow, apparently with brownish bands on the posterior segments. Wings with deep brown spots along the anterior margin; the first is at the inner end of the two basal cells; its hindmost tip, which is in the second basal cell, is connected with a second spot in the first basal cell; the third spot, at the origin of the præfurca, is trapezoidal, its oblique sides being somewhat emarginate; the fourth forms an oblique band between the inner end of the submarginal cell and the anterior margin; the fifth and last is at the posterior end of the stigma.

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The remaining portion of the wing is clouded with brown, as in the three preceding species, only these clouds are darker.

Hab. Slave Lake, H. B. T. (Kennicott).

I have only a single female, the feet of which are broken off and the abdomen somewhat injured in its coloring. The infuscated knob of the halteres and the coloring of the intermediate stripe of the thorax prove the relationship of this species to *L. solitaria*. The structure of the antennæ, the joints of which are comparatively shorter and stouter in *L. hudsonica*, and that of the ovipositor, which is not so broad at the basis, prove to my satisfaction that this is not a darker variety of *L. solitaria*. The anterior branch of the fork, formed by the tip of the auxiliary vein with the subcostal cross-vein, is longer than the posterior one.

In the *Proc. Acad. Nat. Sci. Philad.* 1861, p. 290, I have tried to establish differences between the four above described, closely allied species, based upon the shape of the fork formed by the tip of the auxiliary vein with the subcostal cross-vein. These differences are not entirely reliable, however, as I have had occasion to convince myself since. I possess, moreover, several northern specimens of a doubtful character, which prove either that the number of the species belonging here will have to be enlarged, or that the typical forms of the species, such as I have described them, undergo considerable modifications.

5. L. triocellata O. S. ♂ and ♀.—Flavo-ferruginea, thorace lineis et punctis nigris; alæ flavescentes, ocellis tribus parvis fuscis; venula transversa marginalis juxta apicem primæ longitudinalis sita.

Yellowish-ferruginous, thorax with black lines and dots; wings yellowish, with three small brown eye-like spots; marginal cross-vein at the tip of the first longitudinal vein. Long. corp. 0.35—0.4.

Syn. *Limnobia triocellata* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 216.

Rostrum and palpi brown; antennæ pale ferruginous-yellow; front slightly hoary; vertex yellow. Thorax ferruginous-yellow, shining above; collare long, with a longitudinal brown stripe in the middle; on the mesonotum, two short, brown lines near the collare and four brown spots before the suture; a brown dot on the humerus; pleuræ yellow, slightly hoary, with two or three brown dots between the fore coxæ and the root of the wings; between the thoracic suture and the scutellum, two brown lines in the middle and a dot on each side; metathorax with brown

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marks in the four corners; halteres pale, with brown knobs; feet ferruginous-yellow, hairy; tips of the femora and last joints of the tarsi brownish. Abdomen ferruginous-yellow, margins of the segments brown. Wings tinged with yellow; subcostal cell more saturate yellow; a brown ring at the origin of the præfurca; another, smaller one at the inner end of the subcostal cell; a third, sometimes indistinct one, at the posterior end of the stigma; the anterior end is also marked with a brown spot; a brown shade along the margin of the wing, between the stigma and the apex; tips of the longitudinal veins clouded; a small brown cloud at the inner end of the first basal cell. Tip of the auxiliary vein opposite the inner end of the submarginal cell; the cross-vein at this tip.

Hab. Washington, D. C.; Trenton Falls, N. Y.; Upper Wisconsin River (Kennicott). July, August.

6. L. parietina O. S. ♂ and ♀.—Fuscescens, thorace fusco-vittato; alis longis, versus apicem latis; earum nebulis, strigis et maculis pallide fuscis; stigmate pallido, longo; venulâ transversâ marginali ab auxiliaris et primæ longitudinalis apicibus æque distans.

Brownish, thorax with brown stripes; wings long, broad towards the apex; with pale brown clouds, streaks, and spots; stigma long, pale; the marginal cross-vein at an equal distance from the tips of the auxiliary and of the first longitudinal veins. Long. corp. 0.6—0.65.

Syn. *Limnobia parietina* O. Sacken, Proc. Ac. Nat. Sc. Phila. 1861, p. 289.

Head, rostrum, and palpi dark brown; antennæ pale, joints of the flagellum brown at the basis. Thorax yellowish, sericeous, with three brown stripes; the intermediate one is divided in two by a longitudinal pale, sometimes hardly apparent line; scutellum, metathorax, and pleuræ brownish; halteres infuscated, whitish at the tip; feet tawny, tip of the femora brown; a pale band before it; tarsi brown. Abdomen brownish, posterior margins of the segments and a longitudinal stripe along the middle of the back, pale. Wings with clouds on all the cross-veins and with pale brown irregular clouds, spots, and streaks in almost all the cells; in the submarginal and the second posterior cells, these clouds assume the shape of an inverted V; a trace of a similar figure is visible in the third posterior cell. The stigma is very long, pale; the marginal cross-vein is a little anterior to its middle, and nearly in the middle of the distance between the tip of the auxiliary and

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that of the first longitudinal vein. The outline of the wing is peculiar, as it is hardly narrowed at all towards the apex.

Hab. Trenton Falls, N. Y.; on fences, in September, numerous male and female specimens.

7. L. indigena O. S. ♂ and ♀.—Flavescens; thorace vittis, abdomine fasciis fuscis; alis fusco-nebulosis; venulâ transversâ marginali ab apice venæ longitudinalis primæ remotâ.

Yellowish, thorax with brown stripes, abdomen with brown bands; wings clouded with brown; the marginal cross-vein at some distance from the tip of the first longitudinal vein. Long. corp. 0.4—0.45.

Syn. *Limnobia indigena* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 215.

Head black, front with a silvery reflection; antennæ and palpi black; first joint of the flagellum nearly twice the length of the second. Thorax pale brownish-yellow, shining, with three dark brown stripes, the intermediate one is double and does not quite reach the transverse suture; scutellum dark brown with a yellow line in the middle; metathorax brown; pleuræ with a brown stripe, running from the basis of the wings to the intermediate coxæ; a large brown spot anterior to the basis of the halteres; the latter pale yellow, faintly infuscated in the middle of the stem; feet yellowish-tawny, with two brown bands on the femora and a pale one between them; tip of the tibiæ and the tarsi infuscated. Abdomen brown; base of the second and of the following segments with a broad yellow band; forceps of the male like Tab. III, fig. 7. Wings tinged with yellowish, stigma brown; central cross-veins clouded with brown; three brown clouds form an interrupted and more or less distinct band, in the middle of the first basal cell, on the fifth longitudinal vein and across the anal and axillary cells; veins in the apical portion of the wing all margined with fuscous: the marginal cross-vein is anterior to the middle of the stigma.

Hab. Maine (Packard); Upper Wisconsin River (Kennicott); Washington, D. C.; New York. May, June.

8. L. tristigma O. S. ♂ and ♀.—Ferrugineo-flava, capite nigro, thoracis vittâ fuscâ; alis flavescentibus immaculatis, nebulis quatuor marginalibus parvis, pallide fuscis; venulâ transversâ marginali ab apice venæ longitudinalis primæ remotâ.

Ferruginous-yellowish, head black, thorax with a brown stripe; wings

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yellowish, immaculate, with four small brown clouds along the anterior margin; the marginal cross-vein at some distance from the tip of the first longitudinal vein. Long. corp. 0.4.—0.45.

Syn. *Limnobia tristigma* O. Sacken, Proc. Entom. Soc. Phil. 1859, p. 216.

Head, rostrum, and palpi black, front slightly hoary; the first antennal joint black at the root, yellow towards the tip; the following four or five joints pale yellow; the remainder of the joints infuscated at the basis. Thorax pale ferruginous; a broad brown stripe extends over the collare and the anterior part of the mesonotum; halteres yellow, slightly brownish at the tip; feet yellowish-tawny; femora with two brown bands, one beyond the middle, the other near the tip. Abdomen yellow. Wings yellowish; stigma pale, infuscated at both ends; a small rounded cloud at the tip of the auxiliary vein; another one, but much paler, at the origin of the præfurca; the stigmatical cross-vein is in the middle of the stigma, at some distance from the tip of the first longitudinal vein.

Hab. Near Chicago, Ill., in July, 1859, five male and six female specimens.

This species is somewhat like the European *L. tripunctata* Fab.; only in the latter the marginal cross-vein is infuscated, and not the two ends of the stigma; the three clouds are also much darker than in *L. tristigma*.

9. L. sociabilis, n. sp. ♀.—Ochracea, fronte et abdomine superne infuscatis; thorace vittâ fuscâ; alis immaculatis; venulâ marginali transversâ ab apice venæ longitudinalis modice remotâ.

Ochraceous, front and the abdomen above, infuscated; thorax with a brown stripe; wings immaculate; the marginal cross-vein is at a moderate distance from the tip of the first longitudinal vein. Long. corp. 0.35.

Head yellow; rostrum and palpi likewise; front and a part of the vertex infuscated; antennæ yellow. Thorax ochraceous-yellow, shining above, with a broad brown stripe extending over the collare and the middle of the mesonotum; vestiges of lateral stripes, coalescing with the intermediate one; scutellum and metathorax brownish in the middle. Halteres brownish-ochraceous, paler at the base. Abdomen brownish above, yellow on the under side; ovipositor with remarkably straight upper valves. Wings yellowish, immaculate; the marginal cross-vein is a little beyond

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the middle of the stigma, and hence nearer the tip of the first longitudinal vein than in the preceding species.

Hab. Illinois (Kennicott); a single female. The feet are wanting and the thorax is somewhat injured by the pin; but the species can never be mistaken for any other.

The following species from California has not been included in the dichotomical table on page 87 :—

10. L. californica O. S. ♂.—Thoracis vittis quatuor fuscis; alis fuscescentibus, pallide fenestratis, margine antico maculis quatuor fuscis.

Thorax with four brown stripes; wings brownish, with some subhyaline spaces; anterior margin with four brown spots. Long. corp. 0.7—0.8.

Syn. *Limnobia californica* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1861, p. 288.

Front and vertex brown; under side of the head yellow; rostrum, palpi, and antennæ brown; two basal joints of the latter yellow. Thorax yellowish, mixed with brown; the two intermediate thoracic stripes are narrow, parallel; at their anterior end, they coalesce with the brown margin of the mesonotum, which is broadest at the humeri; pleuræ, scutellum, and metathorax more or less tinged with brownish; basis and tip of the halteres pale, the intermediate portion infuscated; femora brownish; a yellow band before the tip, which is black; tibiæ ferruginous-brownish, brown at the tip; tarsi ferruginous-brownish at the basis, the remainder brown. Wings with a uniform brownish tinge; four large brown spots along the anterior margin; the first at the inner end of the first basal cell; the second, somewhat trapezoidal in shape, at the origin of the præfurca; both do not cross the first longitudinal vein, and do not, therefore, reach the anterior margin; the second is limited posteriorly by the fourth longitudinal vein; the third spot is double, consisting of an oblique spot which begins at the margin, just beyond the tip of the auxiliary vein and coalesces with a round spot at the inner end of the submarginal cell; the fourth spot is at the tip of the first longitudinal vein; it is semi-oval and is inclosed between the costa and the second longitudinal vein; there are several subhyaline spots on the surface of the wing; a large angular one, beginning about the middle of the anal cell and reaching the

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posterior margin at the tip of the seventh longitudinal vein; in the second basal cell (near the great cross-vein); in the discal cell; at the tip of the wing and on both sides of the fourth brown spot; a subhyaline longitudinal streak crosses the second brown spot in the first basal cell and the round spot at the inner end of the submarginal cell is encircled in pale. The subcostal cross-vein is almost in one line with the tip of the auxiliary vein.

Hab. California (Mr. Alex. Agassiz). A single male.

This species belongs to the relationship of *L. cinctipes* and *immatura*, but is easily distinguished by its larger size and by its brownish wings, marked with subhyaline spots.

Gen. V. TROCHOBOLA.

One submarginal cell; four posterior cells; a discal cell; the tip of the auxiliary vein is far beyond the origin of the second longitudinal vein; the marginal cross-vein is some distance anterior to the tip of the first longitudinal vein; *a supernumerary cross-vein connects the sixth and seventh longitudinal veins* (wing, Tab. I, fig. 4). Antennæ 14-jointed. Feet slender; tibiæ without spurs at the tip; empodia indistinct; ungues with teeth on the under side.

Trochobola is most closely allied to the *Limnobiæ* of the second group (those with the marginal cross-vein removed from the tip of the first longitudinal vein); like these species, it has pictured wings, brown bands on the femora, a long auxiliary vein, etc. But it is easily distinguished from them by the presence of a supernumerary cross-vein. The antennæ have less elongated joints, and look almost moniliform; the feet are more slender than in the majority of the *Limnobiæ;* the structure of the male forceps is somewhat intermediate between *Limnobia* and *Dicranomyia;* the fleshy lobes of the latter are somewhat reduced in size here and the rostriform appendage is comparatively larger. (A figure of this forceps has been given by me in the *Stett. Entom. Zeitschr.* 1854, Tab. I, fig. 1; it represents the forceps of the European *T. annulata* Lin.)

The number of species belonging to this genus is small, they have a remarkable distribution all over the world, and they all (as far as known) have the same eye-like spots on the wings. *T. annulata* Lin. (*imperialis* Lw.) and *T. cæsarea* O. S. (perhaps only a variety of the former), occur in northern Europe. *T. argus* Say, is almost identical with the former. I have seen, in

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the British Museum, numerous specimens of *Trochobola* from New Holland, Van Diemen's Land, and New Zealand, showing that they are quite common there; one of them, marked *Limnobia tessellata* White, which I examined, showed precisely the same distribution of the spots on the wings as *T. imperialis* or *argus;* I did not notice, however, whether the other specimens belonged to the same species or not.

In the *Proc. Philad. Entomol. Soc.* 1865, p. 226, I had proposed for this group the name of *Discobola*, which, being preoccupied, is replaced here by *Trochobola* (from τροχὸς, a wheel, and βάλλω, I throw).

1. T. argus Say. ♂ and ♀.—Fuscano-flavida; alis fusco ocellatis.

Brownish-yellow, wings with ocellate brown spots (Tab. I, fig. 4). Long. corp. 0.25—0.3.

Syn. *Limnobia argus* Say, Long's Exped. Append. p. 358.—Wiedemann, Auss. Zw. I, p. 33, 17.—O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 217.

Head, rostrum, palpi, and antennæ black; thorax yellowish with three brown stripes above; the intermediate double; pleuræ with two brown stripes; halteres with a brown band across the stem; knob likewise brown; abdomen brownish, genitals paler; feet yellowish; femora with a brown band at some distance from the tip; tip of the tibiæ and last joints of the tarsi infuscated. Wings yellowish or whitish, with brown, ocellate spots especially along the anterior and posterior margins; the centre of these spots, forming the pupil of the eye, is likewise infuscated; these centres are mostly placed at the origin or at the tip of the longitudinal veins, or upon cross-veins: thus a complete ocellus has the origin of the præfurca for its centre; a double one surrounds, as centres, the inner end of the submarginal cell and the small cross-vein; other centres of less complete ocelli are the tip of the seventh longitudinal vein and the supernumerary cross-vein, existing there; likewise the tip of the sixth vein and the inner end of the fifth basal cell; the apical portion of the wing contains several more ocelli, more or less distinctly marked in different specimens and giving that portion of the wing a variegated appearance.

Hab. Northwestern Territory (Say); Nova Scotia (British

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Museum); Trenton Falls, N. Y.; Maine (Packard); Massachusetts (Scudder); Orange, N. Y.

This species is somewhat variable in its size, the intensity of the coloring, and the distinctness of the spots on the wings. I possess a specimen from Fort Simpson, H. B. T. (Kennicott), which is altogether brownish; the thorax is brown, somewhat yellowish sericeous above, without any apparent stripes; halteres brownish, pale at the basis only; the ocellate spots on the wings are the same as usual, but much darker and somewhat broader, thus imparting a darker coloring to the whole wing. The European *T. annulata* Lin. (*imperialis* Loew, *Linn. Entom.* V, p. 703, Tab. II, fig. 14–15) is hardly more distinct from *T. argus*, than some of the varieties of the latter are one from another. A closer observation will have to teach us what to make of these modifications of the same typical form.

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SECTION II. LIMNOBINA ANOMALA.

One submarginal cell; normal number of the antennal joints sixteen.

This group is meant to be an artificial one, and for this reason I do not add anything to its short character. The brevipalpous *Tipulidæ* with a single submarginal cell and the antennæ of which, at the same time, count 16 joints, never fail to show, as far as hitherto observed, very striking peculiarities of structure, requiring their separation from the very compact and natural section of the true *Limnobina* with fourteen-jointed antennæ.

Thus the genera *Dicranoptycha, Orimarga, Atarba, Teucholabis,* and *Styringomyia* have distinct empodia; a character altogether foreign to the *Limnobina;* moreover, each of these genera possesses characters in the venation, in the structure of the forceps of the male or of the antennæ, which abundantly justify its separation from the *Limnobina.*

Rhamphidia, Toxorrhina, Elephantomyia, Antocha, Elliptera, and *Thaumastoptera* have no distinct empodia; nevertheless, their structural peculiarities are such, that the expediency of their separation from the *Limnobina* will not be disputed.

The link connecting these genera is purely artificial; but experience has proved that the establishment of this group, proposed by me in 1859, is very useful in the system, by collecting under one head a number of genera which would not find a fitting position in any other section. The genera belonging here have but a very limited number of species; most of them are comparatively rare, and, for this reason, as yet little known. Large additions to this group are therefore to be still expected, and these additions may develop links of relationship, not suspected now, as much between already known genera, as even with some of the other sections of the *Tipulidæ brevipalpi.*

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Whether the absence of spurs at the tip of the tibiæ, which distinguishes all the known genera of *Limnobina anomala*,[1] is an indication of some degree of relationship, is as yet uncertain. Until future discoveries disclose the hidden links of relationship between these genera, we can perceive a distinct connection between three genera only, *Rhamphidia*, *Elephantomyia*, and *Toxorrhina*, which I have, for this reason, united in the subsection *Rhamphidina*, treated separately at the end of this paragraph. The genera *Dicranoptycha*, *Orimarga*, *Elliptera*, and *Antocha* show a certain obscure relationship to each other, especially in the venation. *Atarba* and *Teucholabis* seem to be isolated forms. A character worthy of notice in several genera belonging to the *Limnobina anomala* is the tendency of the veins near the costa to coalesce with each other. The first and second veins are very closely approximated in *Elliptera* and *Dicranoptycha*; in *Antocha* the first longitudinal vein coalesces very early with the costa, and in *Toxorrhina* the second vein seems to be entirely absorbed by the first; the latter portion of the first is coalescent with the costa. A similar coalescence is observable in *Styringomyia*. In the present state of our knowledge we cannot judge yet of the importance of these analogies.

Eleven genera constitute this group at present; three of which belong to the subsection *Rhamphidina*. Of the remaining eight genera two (*Dicranoptycha* and *Antocha*) are common to Europe and to North America; three have been found as yet only in Europe (*Orimarga*, *Elliptera*, *Thaumastoptera*); two only in America (*Teucholabis* and *Atarba*), and one is found included in amber and copal (*Styringomyia*).

Subsection RHAMPHIDINA.

One submarginal cell (none in *Toxorrhina*); four posterior cells; a discal cell; *no marginal cross-vein*; normal number of antennal joints sixteen (through the coalescence of the basal joints of the flagellum, 15 or 12). Tibiæ without spurs at the tip. Ungues smooth on the under side. Empodia indistinct or none. *Rostrum conspicuously prolonged.*

The absence of any vestige of a marginal cross-vein, however unimportant it may appear as a character, acquires its significance by its constancy and its concomitance, in the three genera, with

[1] Except perhaps *Atarba*, about which I am in doubt.

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a prolonged rostrum. In other respects, the venation of *Rhamphidia* and *Elephantomyia* is very like that of *Limnobia;* but the smooth ungues of both genera and the number of antennal joints of *Rhamphidia* (the same number existing in *Elephantomyia*, only atrophied) exclude them from among the *Limnobina.*

The most remarkable circumstance, connected with these genera, is their geographical distribution. *Rhamphidia* alone is common to Europe and America; *Toxorrhina* occurs in North and South America, and *Elephantomyia* has hitherto been found in North America only. But the principal prevalence of *Rhamphidia* and *Elephantomyia* seems to have taken place in the period of the amber fauna. According to Mr. Loew (*Bernstein u. Bernsteinfauna*, p. 37) four species of *Rhamphidia* and three of *Elephantomyia* (not distinguished by him from *Toxorrhina*, compare below in these two genera) have been already discovered in amber; a large number, considering the very fragmentary character of our knowledge of the amber fauna, and the small number of the species of these genera in the present age.

Being in possession of a lump of copal, from Zanzibar, in which a specimen of *Styringomyia* is included, I take occasion to give a description of this genus, to complete the statements of Mr. Loew in the *Dipterologische Beiträge*, I, p. 6. This author discovered his specimen in the same substance; another species had been previously found by him in amber (Loew, *Bernst. und Bernsteinfauna*, p. 31 and 38). The name of the genus is apparently derived from στύραξ, a kind of tree-gum.

Styringomyia Loew.—One submarginal cell, the peculiar, subtriangular shape of which depends on the abnormal course of the first and second longitudinal veins, as the former coalesces with the costa before the middle of the anterior margin; the latter, originating from the first vein a little before this point of coalescence, is suddenly incurved towards the costa a little beyond the middle of the anterior margin; the auxiliary vein is not perceptible; four posterior cells; a discal cell. Feet comparatively short, stout, hairy. Tibiæ without spurs at the tip; empodia distinct. Antennæ 16-jointed.

The subjoined figure of the wing is copied from that of Mr. Loew. My specimen is but very little different: the second vein

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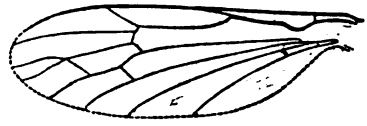
is still more abruptly turned towards the costa, its latter section assuming the appearance of a cross-vein; the præfurca is almost in one line with the third longitudinal vein; the second posterior cell is square at the basis and not attenuated; a trace of a brownish cross-band is distinctly perceptible along the central cross-veins; the cross-veins at the basis of the two intermediate posterior cells are likewise infuscated. The following details not being distinctly visible in my specimen are copied from the description of Mr. Loew: "Palpi short, first joint short-cylindrical, the second a little longer, somewhat incrassated, ovate; the third of about the same length, more slender, cylindrical, the last joint perceptibly longer than the preceding, styliform; the whole palpi are beset with stiff, scattered hairs. The antennæ are not quite as long as head and thorax taken together; first joint elongated-cylindrical, the second pyriform, not very stout; the 14 joints of the flagellum are ovate, of diminishing length and stoutness, beset with short hairs and with longer verticils near the basis. The ovipositor is very short and ends in two sharp points."

Fig. 2.



The resemblance of the venation of *Styringomyia* to that of *Toxorrhina* is very striking, and shows itself in the course of the first and of the second longitudinal veins. If we suppress the section of the latter vein which runs towards the costa, we obtain a venation almost exactly similar to that of *Toxorrhina*. Whether this resemblance is indicative of relationship I am not prepared to say.

Gen. VI. RHAMPHIDIA.

One submarginal cell; four posterior cells; a discal cell; no marginal cross-vein. The tip of the auxiliary vein is at some distance beyond the origin of the second vein; the subcostal cross-vein is close at this tip. Rostrum elongated, but shorter than the thorax; last joint of the palpi elongated. Antennæ 16-jointed. Tibiæ without spurs at the tip; empodia indistinct; ungues smooth. The forceps of the male very like that of *Elephantomyia*.

The rostrum of the European *R. longirostris* is longer than the head and about equal to the distance between the collare and the root of the wings; that of the North American species is but

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slightly longer than the head. The palpi are inserted at its tip; their two first joints are very short, the third but little longer, the fourth linear, slender, about as long as the first three taken together; when at rest, its tip, pointing backwards, reaches but very little beyond the root of the first joint (observed on the N. A. species, when alive; Meigen's Tab. LXV, fig. 8, gives a correct idea of the palpi). Front narrow; eyes almost contiguous on the under side of the head. The antennæ, when bent backwards, hardly reach the root of the wings; flagellum somewhat incrassated at the basis, its joints subcylindrical, short, becoming more elongated towards the tip; verticils moderately long. Collare somewhat broad, prolonged in a short, but distinct neck. Thoracic suture deep. Feet long, slender, very finely pubescent; the interval between the two last tarsal joints is excised on the under side in the male. Wings moderately long and broad, but comparatively smaller in the American species; the tip of the auxiliary vein is opposite the inner end of the submarginal cell; in some specimens the subcostal cross-vein is obsolete; in such cases the auxiliary vein ends in the first longitudinal and not in the costa; the second longitudinal vein originates about the middle of the length of the wing; the præfurca is less than half of the whole length of the second vein and very gently arcuated, nearly straight; the third longitudinal vein is arcuated, which causes the submarginal cell to be much broader at the tip than at its inner end; the latter is, in some specimens, in contact with the discal cell, the small cross-vein being obliterated; this happens with the European, as well as with the North American species; the majority of the specimens, however, have a short, but distinct cross-vein; the discal cell is nearly square; the fifth, sixth, and seventh longitudinal veins are nearly straight; the stigma is oval, distinctly marked, but there is no trace of a marginal cross-vein.

The close relationship between *Rhamphidia* and *Elephantomyia* is evident; the shorter and stouter rostrum and the longer palpi of the former are the only important differences. The venation, including the absence of the marginal cross-vein, is almost the same; the forceps has the same structure; even the coloring of the North American species is remarkably like that of *E. westwoodi*.

In the preceding description I have compared the European

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R. longirostris and the North American *R. flavipes* Macq., not having seen the one or two other species which are said to occur in Europe (compare Schiner, *Fauna Austr.* Vol. II, p. 558). In the Berlin Museum I have seen a Brazilian species and another remarkable species, without indication of the locality, the tarsi of which are white. These species agree with the typical ones in the absence of the marginal cross-vein.

Four species are recorded by Mr. Loew (*Bernst. und Bernsteinfauna*, p. 37) as occurring in the Prussian amber. This would prove that this genus was much more abundantly represented in that fauna than it is now. I have not seen these species, and am not sure whether they belong to *Rhamphidia*, within the sense of my definition of it.

The genus *Rhamphidia* (from ῥαμφος, rostrum) was introduced by Meigen, in 1830 (in his VIth vol.); one year earlier, however, Mr. Stephens proposed for the European *R. longirostris* the generic name of *Leptorhina* (*Stephens, Catal.* etc. 1829), which has never been in use since. Still earlier, in 1825, Saint Fargeau (*Encyclopédie Méthodique, Insectes*, Vol. X, p. 585) proposed for this genus the name *Megarhina*, which he subsequently changed in *Helius* (in the Index to the same volume, p. 831). The claims of the name given by Meigen, strengthened as they are by long usage, cannot well be disputed.

1. R. flavipes Macq. ♂ and ♀.—Femorum, tibiarumque apicibus obscure fuscis; alarum apice infuscato.

Tip of the femora and of the tibiæ dark brown; apex of the wings clouded with brown. Long. corp. 0.27—0.28.

Syn. *Rhamphidia flavipes* Macq. Dipt. Exot. 5e Suppl. p. 17 (1855).
Rhamphidia prominens Walk. Dipt. Saunders. p. 435 (1856).
Rhamphidia brevirostris O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 222.

Head grayish-brown, rostrum but little longer than the head, brown; palpi brown; antennæ brown at the base, flagellum paler. Thorax ochraceous, or brownish, with the usual stripes more or less distinctly marked; halteres pale, sometimes slightly brownish; feet pale yellow; tips of the femora and of the tibiæ dark brown, almost black; tips of the tarsi also darker. Abdomen ochraceous or brownish; the anterior part of the segments darker; the genitals brownish. Wings hyaline, infuscated at the

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tip; stigma well marked, brown; costal and first longitudinal veins yellowish; the other veins brown (compare the generic character for more details about the venation).

Hab. Washington, D. C., in May; New York; White Mountains, N. H.; Wisconsin (Ulke); Illinois (Walsh); South Carolina (Mus. Berol).

This species varies in its coloring from ochraceous to brownish; Mr. Macquart drew his description from a dark specimen, whereas I had a light-colored specimen before me, when I described this species under a different name in 1859. I have since then recognized my error. Mr. Walker's *R. prominens*, some slight discrepancies in the description notwithstanding, is certainly the same species.

Gen. VII. ELEPHANTOMYIA.

One submarginal cell; four posterior cells; a discal cell; no marginal cross-vein; the tip of the auxiliary vein is at some distance beyond the origin of the second longitudinal vein; the subcostal cross-vein is close at this tip (Tab. I, fig. 5). *Rostrum almost as long as the body, very slender, filiform;* the elongated, but minute palpi are inserted at its tip. Antennæ apparently 15-jointed; all the joints of the flagellum are provided with verticils. Tibiæ without spurs at the tip. Empodia indistinct. Ungues smooth. The forceps of the male consists of the usual basal pieces with two horny, claw-shaped appendages each (Tab. III, fig. 8, one-half of the forceps of *E. westwoodi*).

The eyes are large, glabrous, leaving a very narrow, linear front between them above, and a somewhat broader space below. The rostrum is quite as long as the body in the male, and comparatively shorter in the female, on account of the greater length of its abdomen; it is straight in the living specimens, but becomes arcuated in the dead ones; it is finely pubescent and perfectly linear in its shape, from its root to the tip. The palpi are inserted close by this tip; they are attenuated at their basis. Not having had an opportunity to examine these palpi under a compound microscope, on living specimens, I refer to the observations and the fine figures published by Mr. Loew in *Linn. Entom.* Vol. V, p. 400, Tab. II, fig. 19, 20, 21. They are taken from three fossil species, found in amber, which apparently belong to the genus *Elephantomyia*. The palpi of *E. westwoodi* resemble Mr. Loew's fig. 20 most.

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The antennæ, if bent backwards, would hardly reach the root of the wings; the first joint is comparatively shorter than usual; the second is rounded; the basal joint of the flagellum is elongated and stout, being apparently formed by the coalescence of two joints; the following joints are subcylindrical, more elongated towards the tip of the antennæ and beset with rather long verticils. Collare well developed; its neck short; thoracic suture well marked. The feet are long and slender, finely pubescent; the ungues are somewhat broad at the basis; the usual excision on the under side between the two last tarsal joints is apparent in the male. Wings moderately long and broad (Tab. I, fig. 5); tip of the auxiliary vein nearly opposite the inner end of the submarginal cell; the second longitudinal vein originates a little beyond the middle of the length of the wing; the præfurca is arcuated, short, not more in length than about one-third of the remaining portion of the second vein; the latter is nearly parallel to the third vein, and both are arcuated; thus the submarginal cell is of nearly equal breadth; the first posterior is only a little shorter than the submarginal; the discal cell is nearly square; the great cross-vein is usually opposite its middle; the fifth, sixth, and seventh veins are nearly straight; the stigma is oval, distinctly marked, and there is no trace of a marginal cross-vein.

The ovipositor of the female has rather long, narrow valves; the upper ones are very slightly arcuated.

This genus (the name from ἐλέφας, elephant, and μυῖα, fly) was introduced by me in the *Proc. Acad. Nat. Sci. Philad.* 1859, p. 220, and based upon a species which, at that time, I believed to be one described by Mr. Westwood, but which proved afterwards to be new. This is the only living species of the genus at present known; but the three species included in amber and mentioned by Mr. Loew as *Toxorrhinæ* (*Linn. Entom.* Vol. V), apparently belong to this genus.

Observation.—The statements of Mr. Loew (l. c. p. 394) about the "perfect agreement in the generic characters" (vollständige Uebereinstimmung in den generischen Merkmalen) between these fossil species and *Toxorrhina fragilis* from Porto Rico rests upon an oversight of the important difference between them: the absence of the submarginal cell in the latter. I have been able to ascertain this from the drawings of the fossil *Elephantomyiæ*, which Mr. Loew kindly showed me; but I have not seen the specimens themselves. The drawings of which I had a glimpse, showed a wing like *Elephantomyia*, that is, with a submarginal cell. Further in-

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formation about the three fossil species may be gathered from the article in the *Linnæa*. As Mr. Loew believed the antennæ of his specimens of *Toxorrhina fragilis* to be injured at the tip (he could count only 2+10 joints, which is the real number, whereas he expected that they should have 2+13, like the fossil species), he introduces the description of the antennæ of the fossil species thus (l. c. p. 400): "I found the antennæ of two of the fossil species 2 + 13 jointed, while I could count only 12 joints on the flagellum of the third; all the species have the two joints of the scapus short and stout; the first joint of the flagellum likewise is rather large and stout, more or less egg-shaped, the following joints are of a similar shape, but smaller; afterwards they become more slender and gradually more elongated; besides some very short hairs, the joints of the flagellum have sparse verticillate hairs, which, in all the species, become perceptibly longer on the last antennal joints." Thus, the fossil species, like *Elephantomyia*, have 15-jointed antennæ (an unusual number, as we know, among the *Tip. brevipalpi*); the third joint is strikingly incrassated, and, as I have shown above, represents the coalescence of two joints; the fossil species, like *Elephantomyia*, have verticils on all the joints, whereas in *Toxorrhina*, only the two last joints are provided with long hairs; the rest of the description of the antennæ of the fossil species applies equally well to the antennæ of *Elephantomyia*. Another passage is likewise important: "The venation (of *Tox. fragilis*) is also peculiar in several respects; I advert especially to the direction of the veins in the vicinity of the root of the wing and to the connection between the antepenultimate and the penultimate longitudinal veins; the latter does not take place in the fossil species in a similar degree; in these species the first longitudinal vein does not coalesce towards its end with the costa (as it does in *T. fragilis*) and the great cross-vein is farther removed from the root of the wing." If we compare the statement of these differences between *T. fragilis* and the fossil species with the differences existing between the *Toxorrhinæ*, described below, and the *Elephantomyia westwoodi*, we will find them confirmed in every particular. What is called the connection between the 5th and 6th longitudinal veins, will be shown below (in the genus *Toxorrhina*) to be merely apparent, and to arise from the close approximation between the basal portions of these veins (compare Tab. I, fig. 6, the wing of *Toxorrhina*). This appearance does not exist in *Elephantomyia* (Tab. I, fig. 5), which, like Mr. Loew's fossil species, has the two veins more divergent. The peculiar course of the first longitudinal vein, coalescing, towards its end, with the costa, will also be described under the head of *Toxorrhina*; in *Elephantomyia westwoodi*, as in the fossil species, the mode of junction of the first and second veins is the ordinary one. The great cross-vein, in both *Toxorrhinæ* described by me, is either at the very basis of the discal cell, or before it; in *Elephantomyia*, it is opposite the middle of the discal cell; again a point of agreement with Mr. Loew's statement about the fossil species. The principal difference, however, between the venation of *T. fragilis* and the fossil species, consisting in the absence of a submarginal cell in the former, is not mentioned

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in Mr. Loew's comparison; but, as stated above, I have in this respect also confirmed the agreement of *Elephantomyia* with the fossil species.

The foregoing examination can, I think, leave no doubt about the generic identity of *Eleph. westwoodi* with the fossil species. Several years ago, I communicated to Mr. Loew specimens of my *Elephantomyia* for comparison. If he has discovered any difference between them and the fossil species, sufficient to place them in different genera, he will probably mention this difference in his forthcoming work on Amber-diptera.

1. E. westwoodi O. S. ♂ and ♀.—Ochracea, femorum apice fusco, segmentis abdominis fusco-marginatis; stigmate alarum infuscato.

Ochraceous, tip of the femora brown, margins of the abdominal segments infuscated; stigma brownish. Long. corp. 0.3—0.35.

Syn. *Elephantomyia canadensis* O. Sacken (nec Westw.), Proc. Ac. Nat. Sc. Phil. 1859, p. 221; the synonymy given there has to be stricken out.

Head yellow; rostrum finely pubescent; antennæ yellowish, with black verticils; basal joints, especially the second, more or less infuscated. Thorax yellow; a more or less distinct brown stripe runs along its middle and down the collare; in some specimens this stripe is obsolete; halteres pale; feet yellow; femora brown at the tip. Abdomen yellow; posterior margins of the segments brown; a more or less distinct brown stripe along the middle of the back; the last segment brown in the male; forceps tawny. Wings with a faint brownish tinge; a slight nebulosity along the apical margin (for more details compare the generic character).

Hab. Trenton Falls, N. Y., where I found this species in great numbers. At that time I took it for *Limnobiorhynchus canadensis* Westw., as the description of this species (*Ann. Soc. Entom. de Fr.* 1835, p. 683) agrees very well with the present one. But Mr. Westwood's species, which I have seen since in his own collection, is a *Geranomyia*, my *G. communis*; the *Elephantomyia* thus proving to be new, I dedicated this remarkable species to the author of an entomological work which is, as yet, without a rival for completeness, excellence of execution, and corresponding usefulness.

Gen. VIII. TOXORRHINA.

No submarginal cell; a discal cell, and four posterior cells; no marginal cross-vein. *Rostrum very long, longer than head and thorax taken together;*

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palpi exceedingly minute, inserted at its tip. Antennæ very short, 12-jointed: basal joint of the flagellum very stout; *the two apical joints only are provided with long hairs.* Thorax elongated, extended anteriorly into a long, cylindrical neck; mesonotum strongly projecting over the collare. Tibiæ without spurs at the tip. Empodia indistinct or none.

The head is proportionally small; the antennæ are 12-jointed, hardly longer than the head; the first joint is very short, and still shorter in the male than in the female; the second is longer and much stouter than the first, obconical; the third is incrassated, although less stout than the second joint; it seems to represent the coalescence of several joints; it is more or less rounded in the male, and more elongated, almost conical in the female; the remainder of the antenna is filiform; the two apical joints in the male are elongated, slender, and considerably longer than the preceding joints, a difference which is not so striking in the female; the intermediate joints are cylindrical, those nearer to the stout basal joint of the flagellum are sometimes very short and broader than long; the two joints of the scapus bear some short bristles; the pubescence of the flagellum is almost imperceptible; the two apical joints only bear some long bristles, very characteristic for the genus. The front is narrow in *T. magna* and broader in *T. muliebris;* the eyes are slightly emarginate on the inside, to leave room for the insertion of the antennæ and very closely approximated, almost contiguous, on the under side of the head. The palpi, inserted at the tip of the rostrum, are exceedingly minute, and their joints seem to be almost coalescent; they seem to be very like those of *Elephantomyia* (compare, as to the structure of the palpi of this genus, Mr. Loew's figures, *Linn. Entom.* V, Tab. II, fig. 12, 20, 21). The rostrum is slender, perfectly linear, with an almost imperceptible pubescence; both species described below have it about once and a half the length of the head and thorax taken together.

The thorax is rather long, and remarkable for the great and unusual development of the mesosternum, in consequence of which the fore coxæ are at a considerable distance from the intermediate ones; the collare is entirely concealed under a projecting gibbosity of the mesonotum; on the under side, the prothorax is extended into a long, narrow, cylindrical neck, to which the head is fastened; the metathorax is also much developed, rather long and horizontal. The feet are long and slender; their pubescence

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hardly perceptible; the last joint of the tarsi of the male shows on the under side, at the basis, the excision characterizing the male sex in many genera. The tibiæ have no spurs at the tip, and the empodia are imperceptible.

The wings (Tab. I, fig. 6, wing of *T. magna*) are rather short for the size of the body, and not broad.

The first longitudinal vein is short and joins the costa very early and very soon beyond the origin of the second longitudinal vein; the mode of this junction of the first vein with the costa is also peculiar; instead of running parallel to the costa and then taking a sudden turn towards it (as in most *Tipulidæ brevipalpi*), the first vein gradually converges towards the costa and finally coalesces with it, so that, beyond their junction, the costa becomes much stouter. The auxiliary vein is very closely approximated to the first longitudinal and ends in the costa almost opposite the origin of the second vein; the subcostal cross-vein is not far from its tip; there is no vestige of a marginal cross-vein. *There is no submarginal cell, as the second longitudinal vein does not emit any other vein;* the first posterior cell follows immediately after the marginal cell. The fourth vein starts, as usual, from the fifth, very near the basis of the wing, being slightly arcuated at its origin, and connected at this place with the first vein by a small, but very distinct cross-vein. A thickening of the alar membrane almost always exists at this place in the *Tipulidæ;* sometimes it assumes the appearance of a vein; in the present case, however, this cross-vein is particularly distinct, because the origin of the fourth vein is a little more distant than usual from the basis of the wing. Of the two branches of the fourth vein, the posterior one is forked, and a cross-vein between this fork and the anterior branch closes the discal cell.

The sixth vein is very closely approximated to the fifth for more than one-third of its course, and then suddenly diverges at an acute angle from it; in some specimens the basal portions of these veins are so near each other as to appear coalescent; a careful examination, however, proves that they run alongside of each other. The seventh vein is nearly straight.

The forceps of the male, as far as its structure can be ascertained on a dry specimen, seems to be somewhat like that of *Elephantomyia*, that is, it consists of a pair of subcylindrical basal pieces, to which two pairs of ensiform, horny appendages

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are attached. The ovipositor of the female has long, slender, almost imperceptibly arcuated valves.

The relationship of *Toxorrhina* with *Elephantomyia* and *Rhamphidia* is evident, and principally indicated by the prolonged rostrum, common to the three genera, the absence of the marginal cross-vein, and the structure of the feet.

Toxorrhina is easily distinguished from *Elephantomyia* by the venation of the wings, the submarginal cell of which is wanting; by the structure of the antennæ, which are 12-jointed and have some longer bristles on the apical joints only, whereas *Elephantomyia* has long verticils on all the joints, and by the structure of the thorax, the collare being entirely concealed under the projecting gibbosity of the mesonotum, the mesosternum being unusually developed, and the metathorax also rather large and horizontal.

The venation of *Toxorrhina* is unique among the *Tipulidæ*, and it is not easy to decide the disappearance of which veins has brought it about. The wing of *Elliptera* (Tab. I, fig. 10) may afford an explanation. If we imagine that the first and second veins of *Elliptera*, already very closely approximated, coalesce with each other, we obtain a venation not unlike that of *Toxorrhina*. In this case what we have called above the second vein, would in reality be the third. Whether this explanation is the true one, I do not pretend to decide, but it is worthy of notice that several genera among the *Limnobina anomala* show a tendency towards the coalescence of the veins near the costa (*Antocha*, *Styringomyia*, etc.; compare above, p. 101).

The genus *Toxorrhina* was for the first time described and figured by Mr. Loew in 1851 (*Linnæa Entomologica*, Vol. V, p. 400, Tab. II, fig. 17). The pamphlet on the amber fauna, published a year earlier, contains a mere mention of the generic name, without description. The article in the *Linnæa* describes *Toxorrhina fragilis*, from Porto Rico, and, by way of illustration, introduces a mention of the fossil species, assuming their generic identity. The latter, however, as I have shown in the preceding genus, are, to all appearances, *Elephantomyiæ*, as they possess a submarginal cell, verticils on all the joints of the flagellum, etc.[1]

[1] Dr. Schiner (*Reise, etc. der Novara, Diptera*, p. 33) doubts the propriety of using the name *Toxorrhina* for *T. fragilis* and the other living species, instead of leaving it with the fossil species, for which it was origi-

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In 1865 (*Proc. Philad. Ent. Soc.* 1865, p. 227) I published two North American *Toxorrhinæ*, and gave a detailed description of the generic character.

The genus *Limnobiorhynchus* Westw. (*Annales de la Soc. Entom. de France*, 1835, p. 683; the description has been repro-

nally intended. He says: "If Loew introduced this genus for several amber Diptera, which are provided with a submarginal cell, the circumstance that he *afterwards* added to it a species from Porto Rico, which has no such cell, does not prove that the absence of this cell is a characteristic mark of the genus, etc." It seems to me that the question, to which of the two genera does the name *Toxorrhina* rightfully belong? to *T. fragilis* and congeners or to the three fossil species? must be answered by another very natural question, to which of the two does Mr. Loew's description of *Toxorrhina* apply? *Toxorrhina* has been merely named and not described in the pamphlet *Bernstein und Bernsteinfauna*, 1850; it has been described in the following year only, in the *Linnæa*. This description applies to *T. fragilis* only, and not to the three fossil species. The circumstance that these fossil species are provided with a submarginal cell, the circumstance upon which Dr. Schiner's argument rests, has up to this day never been mentioned by Mr. Loew in print; on the contrary, he says expressly that these species are *absolutely similar to T. fragilis, with regard to their generic characters* (Mr. Loew's expressions have been quoted above, p. 107); in other words, destitute of a submarginal cell. As late as in 1861, in a lecture held before the meeting of the German naturalists in Königsberg (*Ueber die Dipternfauna des Bernsteins*), Mr. Loew says: "Among the amber Diptera I also found three species of a Tipulideous genus, which I called *Toxorrhina;* it is remarkable . . . . *for the abnormal venation of its wings.* Afterwards I became acquainted with a living representative of the same genus," etc. Can it be affirmed, after this, that Mr. Loew introduced the genus *Toxorrhina* for certain species provided with a submarginal cell? He could not have very thoroughly examined the amber species, as he overlooked the presence of that cell; *T. fragilis*, on the contrary, he described and figured correctly. There can be no doubt, I think, that the latter is to be considered as the type of the genus. When I discovered *Elephantomyia*, I had no other source of information about *Toxorrhina* but the above quoted description. In consequence, I drew an elaborate statement of the differences between *Toxorrhina* as I found it described and my specimens (*Proc. Acad. Nat. Sci. Philad.* 1859, p. 221), and called the latter *Elephantomyia*.

My purpose, in publishing this somewhat lengthy explanation, is to justify the course I have adopted, which, owing to the intricacy of the question, has been misunderstood; and I hope that the eminent dipterologist, whose collaboration I have enjoyed now for twelve years in the publication of the North American Diptera, will not take offence if, in this instance, my views are not in accordance with his.

8 July 1868.

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duced by me in *Proc. Philad. Entom. Soc.* 1865, p. 231) must be abandoned. I have had the opportunity to see the original specimens in Mr. Westwood's cabinet. The genus, as I had anticipated in the *Proc. Philad. Ent. Soc.* (l. c.) is founded upon the males of one genus and the females of another; the males are *Geranomyiæ* and the female is a *Toxorrhina;* hence it came that the genus was described as having a submarginal cell in the male and none in the female. *Limnobiorhynchus braziliensis* Westw. (♂) is a *Geranomyia;* the female is a *Toxorrhina,* very similar to the male in coloring, and thus mistaken for the same species. *Limnobiorhynchus canadensis* Westw. (♂) is my *Geranomyia communis;* the female is not described.

Toxorrhina seems to be exclusively confined to the American continent. Besides the two species, described below, and the two others, mentioned above (*T. fragilis* Loew, from Porto Rico, and *T. braziliensis* Westw. from Brazil), I am not aware of any species having been described.

The name *Toxorrhina* is derived from τόξον, a bow, and ῥὶς, nose, in allusion to the long rostrum, which is arcuated in dried (but not in living) specimens.

Description of the species.

1. T. magna O. S. ♂ and ♀.—Thorax fusco-flavescens, vittis tribus fuscis, fronte angustâ; alis immaculatis.

Thorax brownish-yellow, with three brown stripes; front narrow; wings immaculate. Long. corp. 0.5—0.6 (without the proboscis).

Syn. *Toxorrhina magna* O. Sacken, Proc. Phil. Entom. Soc. 1865, p. 232.

Head yellowish-cinereous; front narrow, brownish in the middle; antennæ brown; proboscis brown, about once and a half the length of the head and the thorax taken together. Thorax pale brownish-yellow, with three not very dark brown stripes; the intermediate one is rather broad; its sides are parallel and very well defined; beyond the suture, the thorax, including the scutellum and metathorax, is covered with a dense gray bloom; pleuræ brownish-yellow, with a cinereous bloom. Abdomen reddish-brown. Coxæ yellow; feet brownish-tawny; tips of the tibiæ and the tarsi, except the basis of the first joint, brown. Wings hyaline; costal veins yellowish-tawny, the other veins brown; the tip of the auxiliary vein is almost exactly

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opposite the origin of the second vein; section of the second vein, posterior to the small cross-vein, arcuated; the great cross-vein is at the very basis of the discal cell; the cross-vein separating the discal from the first basal cell is very oblique; no vestige of a stigma (Tab. I, f. 6).

Hab. New Jersey, in July (Cresson); a male and a female specimen.

2. T. muliebris O. S. ♂.—Obscure cinerea, fronte latiori, vittis thoracis obscuris, pedibus pallidis, alis immaculatis.

Dark cinereous, front rather broad, stripes of the thorax blackish, feet pale tawny, wings immaculate. Long. corp. 0.3.

Syn. *Toxorrhina muliebris* O. Sacken, Proc. Phil. Entom. Soc. 1865, p. 233.

Head blackish or dark gray; occiput and occipital orbits cinereous; antennæ brownish; basal joints darker; proboscis pale brown. Thorax blackish-gray; the usual three stripes are still darker, almost black; they occupy the greater part of the mesonotum; the latter shows, especially on the sides, a yellowish bloom; metathorax blackish, with a gray bloom. Feet, including the coxæ, yellowish; tarsi infuscated from the tip of the first joint. Abdomen blackish; forceps of the male reddish-yellow. Wings hyaline; no vestige of a stigma; costal and first longitudinal veins tawny, the other veins darker brown; the tip of the auxiliary vein is very slightly beyond the origin of the second vein; the section of the second vein, posterior to the small cross-vein, is strongly arcuated; the cross-vein at the inner end of the discal cell is very oblique; the great cross-vein is a little before the discal cell.

Hab. Princeton, Mass. (Scudder); a single male specimen.

This species is distinguished from the preceding by its much smaller size, its darker and more gray coloring, and its comparatively broader front. Whether the position of the great cross-vein, which in *T. muliebris* is before the discal cell, is also to be reckoned among the constant characters of the species, is uncertain, as I have but a single specimen. The joints of the flagellum of this species immediately following the stout basal joint, are very short and crowded together; they are more elongated in *T. magna*. The color of the only specimen in my possession is somewhat injured by moisture, especially about the head.

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Gen. IX. DICRANOPTYCHA.

One submarginal cell; four posterior cells; a discal cell; the first longitudinal vein very long, its tip is not very far back of the tip of the wing; the submarginal and the posterior cells also elongated; *a distinct fold, originating from about the middle of the sixth longitudinal vein, runs along the middle of the anal cell towards the posterior margin* (Tab. I, fig. 8). Wings elongated, strongly iridescent; veins pubescent. Feet long, pilose; tibiæ without spurs at the tip; empodia distinct; ungues smooth. Antennæ 16-jointed, of moderate length. The forceps of the male consists of the usual basal pieces, with claw-shaped or hook-shaped horny appendages (Tab. III, fig. 12, one-half of the forceps of *D. sobrina;* Tab. III, fig. 11, forceps of *D. nigripes*).

Rostrum short, epistoma transverse, stout; lips rather fleshy; palpi short, second joint short, stout, the third a little longer, the fourth not much longer than the third. Eyes glabrous, front rather broad; on the under side of the head, the eyes are contiguous. The antennæ, when bent backwards, reach the root of the wings in the male; they are a little shorter in the female; second joint stout; four or five basal joints of the flagellum short cylindrical; the following ones more elongated, slightly incrassated at the basis; verticils moderately long. Collare moderately developed, the head closely applied to it; thoracic suture deeply marked. Feet long, rather stout, pilose; empodia large and distinct; no spurs; the usual excision exists on the under side between the two last tarsal joints in the male. The appendages of the male forceps of *D. sobrina* are double on each side; a horny, pointed, unguiform piece, and a more lamelliform, coriaceous, curved piece, with a brush of short hairs at the tip; the forceps of *D. nigripes* (Tab. III, fig. 11) has a somewhat similar structure; only the horny appendages are longer and form a double curve (for more details, compare the explanation of the plates at the end of this volume). Upper valves of the ovipositor are of moderate length, arcuated, somewhat flattened, and rather blunt at the tip. The wings (Tab. I, fig. 8, wing of *D. sobrina*) are elongated and comparatively narrow; the auxiliary vein reaches considerably beyond the origin of the præfurca, and ends in the costa a short distance beyond the inner end of the submarginal cell; the subcostal cross-vein is close by its tip; the first longitudinal vein runs very far towards the apex of the wing; its tip is nearer to this apex than to the tip of the aux-

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iliary vein; the marginal cross-vein is somewhat back of this tip, at a distance which is a little shorter than the great cross-vein; the stigma is indistinct, forming an elongated streak on both sides of the first longitudinal vein; the origin of the second vein is before the middle of the length of the wing; the præfurca, very slightly arcuated at its basis, is generally short, much less than half the length of the submarginal cell; this early origin of the præfurca, its shortness, and the length of the wing, necessitate an unusually long submarginal cell; its sides (second and third veins), are nearly parallel and generally arcuated; the first posterior cell is a little shorter than the submarginal; the discal cell has the shape of a parallelogram; the fold in the anal cell is especially perceptible when the wing is held against the light; it assumes then the appearance of a vein, which disappears before reaching the posterior margin; the three last longitudinal veins are nearly straight. The venation varies but little in the species which I have examined; the difference principally consists in the length of the præfurca. The veins are always finely pubescent; the costa is also more hairy than usual, and sometimes, in the male sex, bears a conspicuous fringe of dense and comparatively long hairs. The wings have a rather striking iridescence, which, as in *Antocha*, seems due to the great density and minuteness of the microscopic pubescence of the surface; although transparent, they have a dull appearance, and are always tinged with grayish or yellowish.

Besides the three species described below, I possess one from California and two occur in Europe. The prevailing colors seem to be dull grayish or yellowish, without any well-marked stripes or bands.

The presence of empodia and the structure of the mouth remind of *Limnophila*, from which, however, *Dicranoptycha* is abundantly distinguished by the want of a second submarginal cell and of spurs on the tibiæ. No immediate relationship can yet be pointed out, except perhaps the European genus *Orimarga*.

The name of this genus, established by me in 1859, is derived from δίκρανον, fork, and πτυχή, fold, in allusion to the fold in the anal cell.

Description of the species.

1. D. germana O. S. ♂ and ♀.—Fuscano-ochracea; alis fulvo-tinctis, opalizantibus; præfurca cellulâ discoidali multo longior.

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Brownish-ochraceous; wings with a fulvous tinge, opalescent; the præfurca is much longer than the discal cell. Long. corp. 0.4—0.45.

Syn. *Dicranoptycha germana* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 217.

Head yellowish-cinereous; palpi brown; antennæ tawny at the basis, darker towards the tip. Thorax brownish-ochraceous, mesonotum above, especially posteriorly, the scutellum and the metathorax with a more or less distinct brownish-gray bloom; lower part of the pleuræ somewhat hoary; halteres ochraceous. Feet ferruginous-tawny, clothed with black hairs; tips of the tibiæ infuscated; last joints of the tarsi brownish. Abdomen brownish-ochraceous, more or less dark; in the male, the last segment is sometimes brown; forceps ochraceous. The wings are of a saturate, fulvous tinge, with a peculiar bluish, opalizing reflection; the veins are fulvous and distinctly pubescent; if viewed obliquely, the veins appear yellow on bluish ground. The præfurca is about once and a third the length of the discal cell; the latter is more than twice as long as it is broad; its inner end is sometimes straight, sometimes oblique and arcuated.

Hab. Trenton Falls, N. Y., where I found this species to be very common in July, 1858.

The description is drawn from dry specimens; among the notes which I took from living ones, I find the following character mentioned: "Abdomen yellow, with five brown spots along the margins, at the incisures." One of the specimens has a stump of a vein near the origin of the præfurca.

2. D. sobrina O. S. ♂ and ♀.—Fuscano-cinerea, alis subcinereis; præfurca cellulâ discoidali non longior.

Brownish-cinereous, wings subcinereous; præfurca not longer than the discal cell (Tab. I, fig. 8). Long. corp. 0.4—0.45.

Syn. *Dicranoptycha sobrina* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 218.
Dicranoptycha sororcula O. Sacken, l. c.

Head yellowish-gray; palpi brown; antennæ brownish; two basal joints paler; the first with a whitish bloom (in some specimens these joints are more infuscated). Thorax gray, with a yellowish-brown bloom above, indicative of the ordinary stripes; the latter are more or less distinctly marked; pleuræ hoary, halteres pale; feet tawny, densely clothed with a moderately long, black pubescence; fore femora sometimes brown, except at

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the basis; the intermediate and hind ones brown at the tip only (sometimes the feet are altogether of a pale coloring). Abdomen blackish-cinereous, venter paler; genitals yellow. Wings with a pale cinereous tinge, iridescent; there is, in some specimens, a slightly more brownish tinge along the anterior margin between the tip of the first longitudinal vein and the apex of the wing; the costa is clothed with black hairs which, in the male, are much longer and form a dense, conspicuous fringe; all the veins are clothed with moderately long hairs; præfurca very short, hardly longer, sometimes evidently shorter, than the discal cell.

Hab. Washington, D. C. Immature specimens of a paler coloring, with uniformly pale feet, and without any trace of a darker tinge near the apex of the wing, often occur.

I possess some specimens from Georgia and Pennsylvania the males of which have no conspicuous fringe of hairs along the costa; the pubescence of their costa is not perceptibly longer than that of the female; the two basal joints of the antennæ seem to be more intensely yellow. This is what I formerly described as *D. sororcula;* but I doubt now that it is a distinct species, and place it among the synonyms, until further observation proves the contrary.

8. D. nigripes O. S. ♂.—Ferrugineo-ochracea, femorum apice nigro; alis fulvescentibus; præfurca cellulâ discoidali non longior.

Ochraceous, with a reddish, ferruginous tinge; tip of the femora blackish; wings yellowish; præfurca not longer than the discal cell. Long. corp. 0.4.

Syn. *Dicranoptycha nigripes* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 218.

Head cinereous, antennæ black; two basal joints ferruginous-yellow; rostrum brownish, palpi black. Thorax reddish-yellow; pleuræ, metanotum beyond the suture, scutellum, and metathorax with a strong hoary bloom; metathorax darker at the basis; halteres pale; coxæ and basis of the femora yellowish-ferruginous, the remainder of the feet is clothed with a dense, black pubescence, which almost entirely conceals the tawny ground color; tip of the femora black, with a yellow band before it, especially distinct on the front part. Abdomen brownish-yellow; the segments of the venter, from the third to the seventh, have transverse black spots in the middle. Wings tinged with brown-

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ish-yellow, which color is more saturate, almost ferruginous, along the anterior margin; there is a fringe of black hairs along the costa, between the tip of the first longitudinal vein and the apex of the wing; the surface of the wing is slightly infuscated along this fringe; veins finely pubescent; the discal cell is at least three times longer than it is broad; the præfurca is not longer than this cell.

Hab. Dalton, Ga.; a single male specimen, taken by me in 1859.

Some remarks about the male forceps of this species (Tab. IV, fig. 11) will be found in the description of the plates of the male genitals, at the end of this volume.

Gen. X. ORIMARGA.

One submarginal cell; four posterior cells; *discal cell open, coalescent with the second posterior cell; great cross-vein about the middle of the wing,* and hence, the fourth posterior cell very long (Tab. I, fig. 9). Tibiæ without spurs at the tip; empodia distinct. Antennæ 16-jointed. Basal pieces of the male forceps elongated, slender, with horny, slender, claw-shaped appendages at the tip; upper valves of the ovipositor small, slender, pointed.

Rostrum projecting, cylindrical, much shorter than the head; eyes large, glabrous; front comparatively narrow. Collare extended in a somewhat elongated neck; mesonotum moderately convex, rather narrowed anteriorly; mesosternum very long. Feet long and slender, apparently glabrous (the pubescence being microscopic); the usual excision between the two last tarsal joints, on the under side, exists here in the male. Abdomen elongated, narrow. Wings elongated, rather narrow (Tab. I, fig. 9). The auxiliary vein ends in the costa a little distance anterior to the inner end of the submarginal cell and at a considerable distance beyond the origin of the second longitudinal vein (this distance being more than one-third of the breadth of the wing); the tip of the auxiliary vein is stout and runs obliquely into the costa which, at and beyond that point, seems to be slightly incrassated; the subcostal cross-vein immediately precedes the tip of the auxiliary vein; the first longitudinal vein reaches far beyond the tip of the auxiliary vein and ends in the costa at a point which is distinctly nearer to the apex of the wing than to the tip of the auxiliary vein; the second longitudinal vein

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issues from the first at about the middle of the length of the wing; the præfurca is angularly bent near its basis (in my specimens even with a vestige of a stump of a vein); its remaining portion is nearly straight, the length of this portion being about two-thirds of the submarginal cell; the portion of the second longitudinal vein which is beyond the origin of the third, is very gently arcuated; the marginal cross-vein is at about the middle of the distance between the tip of the first longitudinal vein and the inner end of the submarginal cell; the stigma is indistinct, forming an elongated streak on both sides of the first longitudinal vein, between the tip of the auxiliary vein and the marginal cross-vein; the first posterior cell is a good deal shorter than the submarginal, as the small cross-vein is about opposite the middle of the distance between the inner end of the submarginal cell and the marginal cross-vein; the veins inclosing the first posterior cell are straight, parallel, converging at the tip only; the inner end of the second posterior cell is not quite in one line with the small cross-vein, but projects a little towards the basis of the wing; the third posterior cell is short, petiolate (and hence, it is the posterior branch of the fourth vein which is forked); the fourth posterior cell is nearly twice the length of the second, as the great cross-vein is removed to the middle of the wing, a little beyond the origin of the second vein; fifth longitudinal vein nearly straight; the seventh, for nearly one-half of its length, runs so closely along the sixth, that they appear coalescent; beyond this, however, the seventh vein diverges from the sixth and runs in a nearly straight line towards the margin of the wing.

The venation of this genus along the anterior margin has an unmistakable resemblance to that of *Dicranoptycha;* they have in common the great distance between the tips of the auxiliary and of the first longitudinal vein, the length of the latter, the shape and position of the stigma, and the position of the marginal cross-vein; both have distinct empodia. The differences (absence of a discal cell and unusual position of the great cross-vein in *Orimarga*) are obvious; but these differences notwithstanding, I incline to believe that the place of the present genus is next to *Dicranoptycha.* We ought not to overlook at the same time the remarkable analogy in the structure of the thorax of *Orimarga* and of *Toxorrhina:* in both the same oblong shape, comparatively narrow, when viewed from above, a long neck, and a remarkable

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development of the mesosternum. Such analogies are to be kept in view, till further discoveries point out their true significance.

The foregoing description has been prepared from two specimens found in Germany, and which I owe to Mr. Loew's communication. They belong, if I am not mistaken, to *Limnobia alpina* Zett. (*Dipt. Scand.* X, p. 389, 69); two other species described by the same author (l. c. 70, 71)—*L. virgo* and *juvenilis*—apparently belong to the same genus. A species similar to, or identical with the one I have now before me, has been seen by me in Mr. Bellardi's collection in Turin; I believe that it was taken in the north of Italy. No American species has as yet been discovered.

The name of this genus, introduced here for the first time, is derived from ὀρείμαργος, meaning *extravagantly fond of mountains.*

Gen. XI. ELLIPTERA.

One submarginal cell; four posterior cells; discal cell open, coalescent with the third posterior cell; præfurca straight, very closely approximated to the first longitudinal vein (Tab. I, fig. 10). Antennæ 16-jointed. Tibiæ without spurs at the tip; empodia not distinct. Forceps of the male rather elongated.

As I have not seen this interesting European genus, I borrow the description partly from its author, Dr. Schiner, partly from a written communication of Mr. Loew; the description of the venation I prepare from specimens of wings which I have before me:[1]—

Head rounded, transverse, rather closely applied to the thorax; rostrum very short; antennæ of moderate length, 16-jointed; first joint short cylindrical, second globose; the third rounded oval, but little longer than broad; the following joints almost globose, with short hairs. Front broad; eyes glabrous, rounded. Thorax gently convex; collare distinct, but short; transverse suture distinct; metathorax well developed; abdomen narrow, the two halves of the forceps long and narrow, leaving an open space between them when closed; ovipositor short, arcuated at the tip. Feet long and slender; tibiæ without spurs at the tip (the pubescence, as it reaches the tip has sometimes the appearance of spurs, which do not exist); empodia indistinct. Wings folded flat over the body, when at rest.

[1] Several wings were kindly sent to me by Dr. Schiner in a letter.

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The auxiliary vein hardly reaches beyond the middle of the wing; the subcostal cross-vein is at a considerable distance from its tip (about three lengths of the great cross-vein); the costa is distinctly incrassated between the tip of the auxiliary vein and the apex of the wing; the tip of the first longitudinal vein is at about the middle of the distance between the two last-named points; the tip of the second longitudinal vein is again at about the middle of the distance between the tip of the first vein and the apex of the wing. The origin of the second longitudinal vein is a short distance beyond the subcostal cross-vein, and at a considerable distance before the tip of the auxiliary vein; the latter distance is more than double the length of the great cross-vein; the præfurca, starting at an exceedingly acute angle, runs very close by the first vein; beyond the origin of the third vein the interval between the first and second veins is a little greater; no marginal cross-vein is perceptible; the stigma is rather long. The third vein has its origin not far from the middle of the distance between the tip of the auxiliary and that of the first longitudinal vein; its first segment forms a sharp curve, almost a quarter of a circle, being sometimes provided at this place with a stump of a vein; its latter segment is gently arcuated. First posterior cell shorter than the submarginal; its inner end almost in a line with the third posterior cell, which is coalescent with the discal cell; the second posterior cell is about half the length of the first; the great cross-vein is almost in one line with the inner end of the third posterior cell, sometimes a little anterior to it; the fifth vein is gently arcuated beyond the great cross-vein; the sixth and seventh veins are nearly straight; the anal angle of the wing is moderately projecting.

The foregoing description applies to the wing of *Elliptera omissa* Schin. But Mr. Loew informs me that he has discovered a second species, the venation of which is somewhat different; the auxiliary vein is longer; and the subcostal cross-vein is nearly opposite the inner end of the submarginal cell.

Elliptera omissa is blackish in coloring, and has, according to Dr. Schiner, somewhat the appearance of *Dicranomyia morio* F. (or *morioides* O. S.); it is not rare in Austria.

The most remarkable feature of the venation of this genus is the course of the second vein, which is so much approximated to the first, as if to foreshadow an absolute coalescence. The position

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of the subcostal cross-vein is also unusual. The incrassation of the costa beyond the junction of the auxiliary vein is likewise observable in *Orimarga*, *Toxorrhina*, and *Antocha*. There is perhaps a certain relationship between *Elliptera* and *Orimarga*; but the latter has distinct empodia, which the former, according to all accounts, has not. On the other hand, the course of the second vein, the shape of the wing, and the absence of empodia somewhat remind us of *Antocha*.

Elliptera (from ἐλλείπω, I omit, perhaps on account of this genus having been overlooked so long) has been first introduced by Dr. Schiner, in 1863 (*Wiener Entomol. Monatschr.* Vol. VII, p. 222, and also *Fauna Austr. Diptera*, II, p. 559).

Gen. XII. ANTOCHA.

One submarginal cell; four posterior cells; a discal cell; *auxiliary vein indistinct, being closely applied to the first longitudinal vein*; the latter convergent towards the costa and finally coalescent with it; the second longitudinal vein, at its origin, forms an acute angle with the first longitudinal; anal angle almost square (Tab. I, fig. 11). Wings with a milky tinge. Antennæ 16-jointed, rather short. Tibiæ without spurs at the tip. Empodia indistinct. Ungues with small teeth on the under side, at the basis. Forceps of the male with comparatively small claw-shaped horny appendages (Tab. III, fig. 10, forceps of *A. saxicola*, from above).

Rostrum cylindrical, somewhat projecting; palpi slender, rather prolonged, although shorter than the head; first joint elongated, second and third shorter; last joint somewhat elongated. The antennæ, if bent backwards, would not reach the root of the wings; basal joint short; joints of the flagellum subglobular, last joint more elongated; the flagellum is beset with short hairs and, on the under side, with a delicate pubescence; no distinct verticils. Eyes glabrous, almost contiguous on the under side of the head; front narrow. Collare but moderately developed; thoracic suture deep. Knobs of the halteres rather large. Feet comparatively short, moderately stout; tibiæ without spurs at the tip; empodia indistinct; the ungues have small teeth on the under side, near the basis, like those of *Dicranomyia*; the last tarsal joint of the male is excised on the under side in the interval between it and the preceding joint. The comparatively broad wings are distinguished by the shape of their anal angle, which is that of a rectangle with a rounded point; the course of the

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auxiliary and first longitudinal veins is peculiar; the former is closely approximated to the latter and therefore rather indistinct; the latter, instead of running parallel to the costa and then turning suddenly towards it (as it usually does), gradually merges into the costa, which is incrassated beyond their junction.[1] The marginal cross-vein is feebly marked, although perceptible. The origin of the second longitudinal vein is like that of *Erioptera*, that is, before the middle of the length of the wing and at a very acute angle; the præfurca is perfectly straight and quite as long as the remainder of the second vein, or longer; the submarginal cell is by one half longer than the first posterior; the latter is square at its inner end, the small cross-vein being comparatively long; discal cell small, almost square; its inner end is oblique, arcuated; owing to the shortness of the first posterior cell, the discal cell is unusually near the tip of the wing; the three last longitudinal veins are nearly straight. The stigma is elongated, its outline rather indefinite.

The wings of the species described below have a peculiar milky-whitish tinge; they are distinctly iridescent, when held obliquely towards the light. Besides, they show another peculiarity: it requires a magnifying power of 150 to discover the microscopic pubescence on their surface; so magnified, they appear covered with black dots, emitting very short hairs (much less power is required to show the pubescence on the wings of most of the other *Tipulidæ*). The forceps of the male (Tab. III, fig. 10) has, on the usual basal pieces, a double claw-shaped appendage, which, as well as I could perceive, consists of a horny and of a soft part, closely joined. The ovipositor is of moderate length, somewhat arcuated.

The peculiar venation and the milky white tinge of the wings, the shape of the anal angle, etc., render this genus easy of recog-

[1] In order to ascertain this peculiarity of the venation with more precision, I compressed a wing of *A. saxicola* between two glass plates. This straightens the fold usually existing in the *Limnobia* between the costal and first longitudinal veins and shows the course of the auxiliary vein with greater distinctness; in this case this vein appeared separated from the first longitudinal by a narrow interval for about one-third of its length only; beyond that both veins ran close along side of each other, till both united with the costa. Under such circumstances there was evidently no room for a subcostal cross-vein.

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nition. The manner in which the first longitudinal vein joins the costa reminds us of *Toxorrhina;* otherwise the genus stands isolated, and no immediate relationship can be pointed out. The absence of distinct empodia and the presence of small teeth on the under side of the ungues constitute a leaning towards the *Limnobina*, which is balanced, however, by the structure of the forceps, etc.

Antocha was introduced by me in the *Proc. Acad. Nat. Sci. Philad.* 1859, p. 219. Since then, the only species (*A. opalizans*) has been found to occur in Europe also (comp. Schiner, *Fauna Austriaca, Diptera*, Vol. II, p. 559).

The name of the genus is derived from its principal character, the proximity of the auxiliary and the first longitudinal veins (ἀντοχή, close approximation, connection).

Description of the species.

1. A. opalizans O. S. ♂ and ♀.—Ochracea vel cinerea, thoracis vittis infuscatis; halteres capitulo fusco; alæ opalizantes, basi pallidâ.

Ochraceous or gray, stripes of the thorax infuscated; knob of the halteres brown; wings opalescent, pale at the basis. Long. corp. 0.22—0.32.

Syn. *Antocha opalizans* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 220.
Antocha saxicola O. Sacken, l. c.

Variable in size and coloring. Head grayish-brown; rostrum yellowish, sometimes infuscated; palpi and antennæ brown; the first joint of the latter sometimes yellowish. Thorax either ochraceous, or brownish-gray, with some yellowish spots on the humeri and pleuræ; in both cases with darker, more or less distinct stripes; halteres pale, with a more or less brown knob; feet tawny, more or less dark, according to the general coloring of the specimen; coxæ and base of the femora generally paler. Abdomen brownish or grayish-brown; the genitals often, but not always, yellow. Wings (Tab. I, fig. 11) with a whitish, somewhat milky tinge, opalescent; the veins at the basis of the wings pale yellow; the other veins more or less dark brown; stigma colorless.

Hab. Europe and North America. I possess specimens from Dalton, Ga.; Washington, D. C.; Trenton Falls, N. Y.; Montreal, Can.; Lake Winnipeg, H. B. T. (Kennicott); Illinois (Le Baron). The specimens from the north are generally larger. This species has been noticed in Europe only since it was discovered and described by me in North America; it occurs near running water,

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and I observed the gray variety (*A. saxicola*, olim) in large numbers, in May, 1859, on mossy stones in a creek, near Washington, D. C., performing a singular, sideways walk along the water's edge, probably for the purpose of oviposition; some of them were in copulation. I have no doubt now that *A. saxicola* is only a variety of *A. opalizans;* I have received larger specimens of it from the north, and I understand that this variety also occurs in Europe.

Gen. XIII. ATARBA.

One submarginal cell; four posterior cells; a discal cell; *no marginal cross-vein;* tip of the auxiliary vein nearly opposite the origin of the second vein; the subcostal cross-vein at a distance from this tip which is a little shorter than the great cross-vein (Tab. I, fig. 13). Rostrum short. Antennæ 16-jointed, *rather long.* Tibiæ without spurs at the tip (?); empodia distinct; ungues smooth. The large forceps of the male consists of two elongated subcylindrical basal pieces, each bearing a double horny, claw-shaped appendage.

Eyes glabrous; front rather narrow; rostrum but little projecting; palpi rather long, especially the last joint. Antennæ rather long, reaching beyond the basis of the abdomen, when bent backwards; first joint short, not much longer than the second; joints of the flagellum elongated, cylindrical, gradually decreasing in length; they are clothed with a dense pubescence; a single, somewhat longer hair is perceptible on each segment, above the pubescence; the antennæ of the female are but little shorter than those of the male. Collare short—the head being rather approximated to the mesothorax. Thoracic suture distinct. Feet of moderate length, comparatively stout, finely pubescent; empodia distinct. The forceps of the male is large and not unlike Tab. IV, fig. 29, in appearance, only more hairy; the basal pieces leave an open interval between them, even when the forceps is closed; the ends of the claw-shaped appendages are distinctly bifid, showing that they consist of two closely approximated horny pieces; there is a short stump in the place of the anal style of the *Limnobina* (one of my specimens has a long curved aculeus projecting on the under side; in the other male specimen this organ is apparently concealed internally). As the specimen, which I believe to be a female, has its abdomen broken off, I cannot describe the ovipositor.

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Wings (Tab. I, fig. 13, wings of *A. picticornis*) of moderate length and breadth; anal angle somewhat projecting; veins with a hardly perceptible pubescence. The tip of the auxiliary vein and the origin of the second longitudinal vein are a little beyond the middle of the length of the wing; no trace of a marginal cross-vein; the præfurca is short and arcuated (less than one-third of the remaining portion of the second vein); third longitudinal vein gently arcuated; the first posterior cell a little shorter than the submarginal; its sides nearly parallel; the discal cell is not much longer than broad; the great cross-vein is in a line with the inner end of the discal cell; fifth vein slightly arcuated beyond the great cross-vein; the sixth and seventh veins are nearly straight.

I do not perceive any spurs on the tibiæ in the three specimens which I have before me; but most of their feet are broken off, and I believe formerly to have seen spurs on the middle pair of feet, which is lost now. The question about the spurs is therefore left doubtful.

The general appearance of the body is not unlike *Limnobia*, only the antennæ are comparatively longer. The genus can be easily recognized by its long antennæ and the absence of a marginal cross-vein.

The name of this new genus is derived from ἀταρβής, fearless.

Description of the species.

1. A. picticornis, n. sp. ♂.—Ferrugineo-flava; antennarum flagelli articulis singulis dimidio apicali infuscato.

Reddish-yellow; the latter half of the single joints of the antennal flagellum infuscated. Long. corp. 0.2—0.25.

Ochraceous yellow, with a more or less reddish tinge. Head yellow, front and vertex with a grayish reflection; palpi infuscated at the tip; antennæ yellow; the single joints of the flagellum pale brown at the tip, this brown gradually gaining ground in the subsequent joints till the last joints are almost entirely brown. Thorax reddish-yellow, shining above; pleuræ with a very slight hoary reflection; halteres ferruginous-yellow; feet yellow, tarsi brownish towards the tip. Abdomen yellow; penultimate segment dark; forceps yellow, the horny claw-shaped appendages black. Wings with a pale yellowish tinge; veins yellow.

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Hab. Delaware (Dr. Wilson); District Columbia (?). I am not quite sure of the latter locality.

Observation. I have for comparison two males and a specimen without abdomen, which is probably a female, as its antennæ are somewhat shorter.

Gen. XIV. TEUCHOLABIS.

One submarginal cell; four posterior cells; a discal cell; *first longitudinal vein very short*, its tip being but little beyond the middle of the length of the wing, nearly opposite or not much beyond, the inner end of the submarginal cell (Tab. I, fig. 12). Wings very hyaline, stigma rounded. Antennæ 16-jointed. Rostrum cylindrical, distinctly prolonged, although shorter than the head. *Collare prolonged in a narrow, linear neck.* Feet rather stout, hairy; tibiæ without spurs at the tip; empodia distinct, but small. Genitals of the male hairy on the outside; forceps with large, horny appendages and an anal style (Tab. III, fig. 9).

Eyes glabrous, more or less remote above, almost contiguous below. Palpi short, inserted at the tip of the short, cylindrical rostrum; last joint very short. The elongated, neck-like collare, although shorter than the head, is a very striking feature of this genus. Antennæ of moderate length; if bent backwards, they would not quite reach the basis of the wings; scapus of the usual structure; flagellum with oblong or rounded, well-separated joints, clothed with a short pubescence and with verticils, which are a little longer than the pubescence.

Feet of moderate length, comparatively short and rather stout, clothed with a rather long and dense pubescence; ungues apparently smooth; empodia small, but very distinct.

The forceps of the male consists of two oblong lobes, somewhat like those of *Dicranomyia:* large horny appendages on their under side; anal style distinct (Tab. III, fig. 9, represents the forceps of *T. complexa* from above; fig. 9 a, one-half of it, from below); in dried specimens none of these organs are perceptible. The tip of the abdomen is hardly incrassated, but always hairy. The valves of the ovipositor are of moderate length, slender, arcuated.

The wings (Tab. I, fig. 12, wing of *T. complexa*) are comparatively short, often broad; they are very transparent and the microscopic pubescence, common to all the wings of Diptera, seems to be more coarse and scattered here, as a moderate mag-

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nifying power shows it distinctly. The stigma is short and rounded. The tip of the auxiliary vein is about the middle of the length of the wing; the subcostal cross-vein at a moderate distance before this tip; the tip of the first longitudinal vein is at a comparatively short distance beyond the tip of the auxiliary vein, almost opposite the tip of the sixth longitudinal vein, and but little beyond the inner end of the submarginal cell. The second longitudinal vein originates before the middle of the length of the wing; the præfurca is gently arcuated, and (in both species which I have before me) of nearly the same length with the remaining portion of the second vein, or a little shorter. The marginal cross-vein, placed very near the end of the first longitudinal vein, divides the marginal cell in two nearly equal halves; this cross-vein is almost in a line with the inner end of the submarginal cell and with the small cross-vein; the third longitudinal vein is arcuated; the discal cell somewhat elongated, its inner end narrowed; the great cross-vein is nearly opposite the small one; the fifth longitudinal vein is straight; the sixth nearly so; the seventh gently arcuated.

The two species which I have before me (a North American and a Mexican one) have nearly the same venation; only in the North American species the discal cell projects on the inside of the cross-veins, whereas in the Mexican one the marginal cross-vein and the inner ends of the submarginal, first posterior, discal, and fourth posterior cells are all in one line. The venation of *T. simplex* Wied., as figured by that author (*Auss. Zw.* I, Tab. VI, b, fig. 8) is nearly the same, only the marginal cross-vein is a little beyond the inner end of the submarginal cell, and not in a line with it. The wing of *Rhamphidia scapularis* Macq. (*Dipt. Exot.* I, 1, Tab. X, fig. 1), which is undoubtedly a *Teucholabis*, has the same venation; even the peculiar curve or ear, formed by the first longitudinal vein before joining the costa, and which is likewise perceptible in the two species before me, is correctly represented by Macquart.

The peculiarity of the venation of *Teucholabis* consists in the shortness of the auxiliary and the first longitudinal veins; the tip of the latter, for instance, is not much beyond the inner end of the submarginal cell; whereas, in the other *Tipulidæ*, it is usually more or less far beyond this end. The marginal cross-vein, being near the tip of the first vein, is thus naturally brought in one line

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with the inner end of the submarginal cell. The comparative length of the cells in the apical half of the wing and the corresponding shortness of the two basal cells, are among the striking characters of this genus. The stoutness of the veins and the clearness of the membrane of the wing are likewise characteristic.

Teucholabis seems to be peculiar to the American continent, at least no species belonging to it has as yet been discovered in Europe. Besides the North American species described by me, the following species, by former authors, belong here :—

Limnobia simplex Wied. *Auss. Zw.* I, p. 549, from Brazil. I have seen the original specimen in Mr. Loew's collection.

Limnobia flavithorax Wied., from Brazil, according to Dr. Schiner, who also describes a new species—*T. spinigera* (*Reise*, etc. *der Novara, Diptera*, p. 44).

Rhamphidia scapularis Macq. *Dipt. Exot.* I, 1, Tab. X, fig. 1; likewise from Brazil, is, to all appearances, a *Teucholabis*.

I have seen several specimens from Mexico in Mr. Bellardi's collection. In drawing the generic character I had, besides *T. complexa*, a male specimen from Mexico before me, which I owe to the kindness of Mr. Bellardi. Its wings are somewhat narrower than those of *T. complexa*.

This genus, first established by me in 1859 (*Proc. Acad. Nat. Sci. Philad.* p. 223), for the North American *T. complexa*, and now corroborated by the comparison of several other species, is very easily distinguishable by its neck-like collare, its broad, clear wings, and the peculiarities of its venation. No immediate relationship can be pointed out.

The name is derived from τεῦχα, weapons, and λαβίς, forceps, in allusion to the horny processes of the male forceps.

Observation. Besides the South American and Mexican species mentioned above, as belonging to *Teucholabis*, I have seen in Mr. Bellardi's Mexican collection two forms, closely related to this genus, but which may perhaps be separated from it. One of them is distinguished by the presence of a supernumerary cross-vein at the extremity of the second longitudinal vein, dividing the marginal cell in two parts, and by the shortness of the first posterior cell, in consequence of the submarginal cell being in immediate contact with the discal cell. The 16-jointed antennæ, the development of the collare, the stoutness and pubescence of the feet, the shortness of the first longitudinal vein and of the

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auxiliary vein, the course of the second longitudinal vein, the position of the marginal cross-vein, the hairy appearance of the male forceps, and finally the general appearance and coloration of the body, render evident its close relationship to *Teucholabis*.[1]

The other form is at once conspicuous by its rostrum, which is much more elongated than is the case in *Teucholabis*, and gives it the appearance of a *Rhamphidia*. This resemblance, however, is entirely superficial; the venation of the wings, as well as the structure of the body, very plainly shows that these insects are most closely allied to *Teucholabis*. The *Rhamphidia chalybeiventris* Loew (*Wien. Entomol. Monatschr.* 1861, p. 33), from Cuba, is not a *Rhamphidia*, but belongs to this form of *Teucholabis*.

Description of the species.

1. T. complexa O. S. ♂ and ♀.—Obscure ochracea, thoracis vittis tribus brunneis; alis hyalinis, stigmate subrotundo, fusco.

Brownish-ochraceous, thorax with three brown stripes; wings hyaline, stigma rounded, brown. Long. corp. 0.25—0.27.

Syn. *Teucholabis complexa* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 223.

Head dark brown, with a hoary bloom on the front; antennæ and palpi black; the former with oblong joints on the flagellum.

[1] This volume was already in press, when, through the kindness of Dr. Schiner, I received his work on the Diptera of the Voyage of the "Novara" (*Reise d. Oesterr. Fregatte Novara, etc. Zoologischer Theil; Diptera;* Wien, 1868); it contains a detailed description, with figures, of the new genus *Paratropesa*, the generic characters of which had been published some time earlier (*Verz. Zool. Bot. Ges. in Wien*, 1866). *Paratropesa* (type: *P. singularis* Schin., from Colombia, South America) is evidently the above-mentioned form of *Teucholabis*, of which I have had a glimpse, in 1865, in Mr. Bellardi's collection. The comparison of what I say about it, as I find it among my notes, with Dr. Schiner's description shows, that we agree in the interpretation of the veins forming the submarginal and first posterior cells; but that we disagree in the interpretation of the anterior branch of the second vein, which I considered as a supernumerary cross-vein. Such an interpretation permits me to retain the genus among those with a single submarginal cell, as its relationship to *Teucholabis* seems otherwise evident to me. *Paratropesa* is undoubtedly a good genus, and I am glad to have had the opportunity to identify it before the issue of the present volume. Dr. Schiner's description of *Paratropesa* will be found in the Appendix II, at the end of this volume.

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Thorax brownish-ochraceous, with three brown stripes; the intermediate one begins at the collare; the lateral ones are abbreviated before and extended beyond the suture behind; scutellum yellow, metathorax more or less brown in the middle, yellow on the sides; pleuræ yellow, with a more or less distinct brown stripe, running from the collare to the base of the halteres; the latter pale. Feet pale yellowish; tips of the femora and of the tibiæ brown; last joints of the tarsi brown. Abdomen brown, posterior margins of the segments a little paler; male forceps tawny. Wings (Tab. I, fig. 12) hyaline, veins brown, costal and subcostal tawny; anterior margin distinctly hairy; stigma brown, rounded, near the tip of the first longitudinal vein. (For the further description of the venation compare the generic characters.)

Hab. Washington, D. C.; Trenton Falls, N. Y., in June; Illinois (Mr. Kennicott). A specimen from Georgia, in the Berlin Museum, seems to belong here..

One of my specimens, a male, shows a slight difference in the venation; the latter portion of the second longitudinal vein is more straight, and the cross-vein, closing the discal cell, is a little nearer to the apex of the wing, which changes the shape of the discal cell. The original description of this species was drawn from four specimens; I have only two left at present.

Gen. XV. THAUMASTOPTERA.[1]

Not having seen this European genus, I translate the following description by Mr. Mik, from the *Verh. Zool. Bot. Gesellsch. in Wien*, 1866, p. 302. The appended woodcut is copied from a figure in the same volume:—

Head rounded, transverse, somewhat flattened; occiput rather strongly developed; rostrum moderately prolonged; palpi four-jointed, the two last joints of equal length, more slender than the two first; front broad in both sexes; antennæ rather short, 16-jointed; first joint cylindrical, of the length of the rostrum, the second cyathiform, transverse, the following joints oblong, sessile, somewhat verticillate, gradually diminishing in size; the last joints indistinct. Eyes round, glabrous. Thorax convex, gibbose, projecting over the narrow collare; transverse suture distinct; scutellum narrow; metathorax well developed. Abdo-

[1] Θαυμαστός, wonderful; πτερόν, wing.

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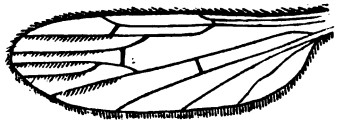
men with seven segments, short; the forceps with stout, obtuse appendages; ovipositor long, with a gently arcuated tip. Feet long and slender; the tibiæ without spurs; empodia indistinct; ungues smooth. Wings comparatively long; longitudinal veins pubescent, the margin fringed with hairs; the auxiliary vein ends in the costa about the middle of the length of the wing; second longitudinal vein not forked, connected by a cross-vein with the first longitudinal vein; third longitudinal vein not forked; the fourth longitudinal vein is forked a short distance from the small cross-vein; its principal branch runs straight to the margin; the anterior branch is forked; the branches of this fork are longer than the petiole; fifth and sixth veins straight; the seventh is somewhat sinuated; no discal cell; the subcostal cross-vein is very near the origin of the præfurca; the great cross-vein is in the middle of the wing, quite far from the branching of the fourth vein; hence, the second basal cell is almost half as long as the first; the anal angle of the wing rounded, but little projecting.

Fig. 3.



Type of the genus *T. calceata* Mik, found near Görtz, in Illyria. The author describes it as a very delicate, pale yellow species, about 0.2 lin. long, with dark brown tips of the femora and of the tibiæ, looking like *Erioptera imbuta* Meig. It is on the author's authority that I leave this genus among the *Limnobina anomala*, to which he refers it.

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SECTION III. ERIOPTERINA.

Two submarginal cells; four (very seldom five) posterior cells; discal cell sometimes closed, but very often open. Normal number of the antennal joints sixteen. Eyes glabrous. *Tibiæ without spurs at the tip;* empodia distinct; ungues smooth on the under side.

The *Eriopterina* hold an intermediate position between the *Limnobina* and the *Limnophilina*. Like the latter, they have two submarginal cells and 16-jointed antennæ and distinct empodia; but, like the former, they have no spurs at the tip of the tibiæ. Similar to all the spurless *Tipulidæ*, they have only four posterior cells; *Cladura* is the only exception, the only tipulideous insect to me known which has no spurs at the tip of the tibiæ and nevertheless five posterior cells. Besides the characters enumerated at the head of this paragraph, the typical *Eriopterina* (the genera *Rhypholophus*, *Erioptera*, and *Trimicra*) have some striking peculiarities of the venation in common. The subcostal cross-vein is placed at a very considerable distance before the tip of the auxiliary vein; the second longitudinal vein originates nearer than usual to the root of the wing, and the præfurca forms, at its basis, a very acute angle with the first longitudinal vein (compare Tab. I, fig. 14–20, and Tab. II, fig. 1). In the other genera, these typical characters gradually disappear. Already in *Symplecta*, closely related as it is to the three former genera, the præfurca is gently arcuated at its basis. *Gnophomyia* loses another important character; its subcostal cross-vein is only at a moderate distance from the tip of the auxiliary vein. *Goniomyia*, owing to the presence of a second submarginal cell, and the absence of spurs at the tip of the tibiæ, has to be placed among the *Eriopterina;* but its immediate relationship has, for a long time, seemed doubtful to me. I believe now that *Psiloconopa*, the European representative of *Gnophomyia*, forms the transition between

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Goniomyia and the typical *Eriopterina*. That *Cryptolabis* belongs here will hardly be questioned. *Cladura*, with its five posterior cells, looks exactly like the *Limnophilina;* its resemblance would be complete if it had spurs at the tip of the tibiæ.

Chionea has been hitherto placed at the end of the *Tipulidæ*, as an anomalous group, without any distinct relationship. The strict application of the characters upon which the classification adopted by me is based, points out its place very clearly. *Chionea* has no spurs at the tip of the tibiæ, which would locate it either among the *Eriopterina* or among the *Limnobina*. Its distinct empodia and smooth ungues determine its location among the former. If we compare *Chionea* with the European *Trimicra pilipes* we cannot but be struck by the analogies between them; the same incrassated male forceps; the same stout, hairy feet; and even the anomalous structure of the antennæ of *Chionea* is foreshadowed in *Trimicra* in the abrupt reduction of the size of the three last antennal joints. *Chionea* has therefore to be placed next to *Trimicra*, and is closely allied to *Erioptera*.

The review of the genera of *Eriopterina* just given shows that, upon the whole, this section is less homogeneous than any other (except the *Limnobina anomala*). The link connecting some of the genera, like *Cladura*, for instance, with the typical forms, is apparently artificial; a *Limnophila* with the spurs of the tibiæ so short as to appear obsolete, would, to all appearances, approach *Cladura*. The same remark may be applied to the *Limnophilæ* with four posterior cells, and *Gnophomyia;* the former may have obsolete spurs; they would then be hardly distinguishable from the *Eriopterina*. Is the distinction between those genera, based upon the presence or absence of spurs on the tibiæ, the expression of a real fact in nature or only an artificial subdivision? I believe this distinction to be a real one, although I confess that it would be very desirable to discover some more characters to support it. The male forceps of both *Gnophomyia* and *Cladura* is very different from that of most *Limnophilina;* still, it would be necessary to show that it is more cognate to the forceps of the *Eriopterina*. Here, as in many other cases, the discovery of new forms may help to solve these difficulties.

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Besides the characters of the *Eriopterina* which have already been enumerated, there is one which deserves to be mentioned here. In this group of *Tipulidæ* the *anterior* branch of the fourth longitudinal vein is quite frequently forked, while the *posterior* branch is simple, and thus, when the discal cell is open, it coalesces with the *third* and not with the *second* posterior cell. We find this structure in two North American *Eriopteræ* (*E. caloptera* Say, and *parva* O. S.), three North American and several European *Rhypholophus;* in all the *Goniomyiæ*, which have no discal cell, and in the European *Psiloconopa lateralis* Macq. (*flavolimbata* Hal.). Among the other *Tipulidæ* this structure is rare (compare the Introduction, page 33).

I am not aware that any genus of *Eriopterina*, foreign to Europe and North America, has been published, unless *Lachnocera* Philippi (*Verh. Zool. Bot. Ges. in Wien*, 1865, p. 615, Tab. XXIII, fig. 5), from Chile, belongs here. The venation of this genus is not unlike that of *Goniomyia;* it also reminds of a *Limnophila* with four posterior cells. The statements of the author are not complete enough to admit of any certain conclusion. The translation of the description is given in the Appendix.

The following new genus, from Mexico, is in Mr. Bellardi's collection, in Turin :—

Sigmatomera, nov. gen. (from σίγμα, the letter s, and μέρος, part).

Two submarginal cells, four posterior cells, and a discal cell; the tip of the auxiliary vein is not much beyond the basis of the second submarginal cell; the subcostal cross-vein is at a moderate distance from this tip; tibiæ without apparent spurs; empodia small; antennæ (♂) 16-jointed, more than once and a half the length of the head and the thorax taken together; joints subreniform, nodose; eyes (♂) very large, convex, almost contiguous on the upper as well as on the under side of the head.

The very large, convex, apparently bare eyes, come almost in contact on the front; they are separated by a small triangle above the antennæ, and by a very narrow, linear space above this triangle. The rostrum is rather short, and shows the general structure of the *Limnophilina*—two stout lips being visible below the oblong epistoma. The palpi are of moderate length, and the last joint is more prolonged than is generally the case among the *Limnophilina*. The antennæ remind of those of

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Nephrotoma. The first joint is very short, the second almost rudimental; the third joint (first joint of the flagellum) is more than four times the length of the first and second taken together; it is subcylindrical, with a rounded projection on the under side near the tip; the fourth joint has about four-fifths of the length of the third; it has almost the shape of a recumbent *S*; it is attenuated at the basis and in the middle, whereas the intermediate parts are incrassated, as also the tip of the joint which projects distinctly on the under side; the following joints (from the fifth to the fifteenth) have exactly the same shape as the fourth, only they very gradually decrease in length and this peculiar shape becomes less and less distinct; the sixteenth and last joint is subcylindrical and almost rudimental. The joints of the flagellum are densely clothed with a delicate down; each of them bears two longer hairs on the upper side near the basis, and two similar, only shorter hairs, on the projecting sinuosities of the under side.

The collare is narrow and but little developed. The thorax has on the upper side, between the transverse suture and the scutellum, a pair of peculiar pits or impressions, originating on each side near the root of the wing and running towards the middle (I do not know whether they were not accidental in the described specimen). I cannot say anything positive about the male genitals, except that they do not give to the tip of the abdomen a club-shaped appearance. The feet (the specimen had only a single anterior foot left) are very long; their pubescence is short and not at all striking. No spurs are perceptible at the tip of the tibiæ. The last joint of the tarsi of the male has no excision on the under side.

The wings are rather long and moderately broad. The marginal cross-vein is very little before the tip of the first longitudinal vein. The stigma is inclosed between the subcostal and marginal cross-veins. The origin of the second longitudinal vein is rather before the middle of the anterior margin; the præfurca forms a straight line with the third longitudinal vein; first submarginal cell shorter than the second; the latter very square at its basis, nearly of the same length with the first posterior; the discal cell somewhat elongated.

The coloring of the only species I have seen is yellow (it will be published shortly in Mr. Bellardi's work on Mexican Diptera).

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en. XVI. RHYPHOLOPHUS.

Two submarginal cells; four posterior cells; discal cell present or absent. *Wings pubescent on the whole surface* (Tab. I, fig. 14, wing of *R. nubilus;* fig. 15, *R. rubellus*). The second longitudinal vein originates at a more or less acute angle, before the middle of the anterior margin; the subcostal cross-vein is a considerable distance (two or three lengths of the great cross-vein) anterior to the tip of the auxiliary vein. Antennæ 16-jointed. Tibiæ without spurs at the tip; ungues smooth on the under side; empodia distinct.

This genus is closely allied to *Erioptera* and distinguished from it by the wings, which are densely pubescent on the whole surface. As in *Erioptera*, the intermediate pair of feet is usually the shortest here; however this character is less striking in *R. nubilus*. The antennæ of some species are longer than usual in the male sex and the joints of the flagellum are elongated, strongly pedicelled, and pubescent (the genus *Ormosia* Rondani is founded upon this character). The structure of the forceps of the male varies in different species, and the study of these variations would probably afford an insight into the true affinities between the species. I have not had the necessary opportunities for the study of these parts on living specimens. The principal modification in the venation of the wings in this genus consists in the presence or absence of a discal cell; when it is absent, we generally find that the *anterior* branch of the fourth vein is forked (as in Tab. I, fig. 15); this constitutes the genus *Dasyptera* of Dr. Schiner; but this is not always the case; sometimes, as in *R. holotrichus*, it is the *posterior* branch of the fourth vein which bears the fork. The course of the seventh longitudinal vein is also variable; sometimes it is nearly straight (*R. innocens*); sometimes arcuated at the basis in such a manner that its first half runs very near the sixth longitudinal vein (*R. nigripilus*); sometimes arcuated in the opposite direction, with the concavity towards the sixth vein; in this case the tip of the seventh vein is approximated to the tip of the sixth, and the axillary cell is broader in the middle than at the end. This is the case with *R. holotrichus*, and reminds of a similar course of the seventh vein in *Erioptera* (subgenus *Erioptera*).

Dr. Schiner, in subdividing the genus *Erioptera*, adopted two genera for the species the wings of which are hairy on the whole surface: *Rhypholophus*, with a discal cell, and *Dasyptera*, with-

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out discal cell, and with the *anterior* branch of the fourth vein forked. This subdivision, according to my opinion, is not satisfactory. I possess a North American species (and European species of the same kind may also occur) which has no discal cell, but the *posterior* branch of the fourth vein of which is forked. Such a species would neither be a *Rhypholophus*, nor a *Dasyptera*. We might enlarge the character of *Dasyptera* and admit in it all the species without a discal cell. But in the family of *Tipulidæ* we have abundant evidences of the fact, that the mere presence or absence of the discal cell, if unsupported by other characters, has but very little systematic value. Moreover, in the genus *Erioptera* itself, we have the proof, that a discal cell may be formed by the forking of either the *anterior* or the *posterior* branch of the fourth vein (compare in that genus the subgenera *Acyphona* and *Mesocyphona*). Therefore, a subdivision based upon the mere presence or absence of a discal cell would not be a natural one. The comparison of the structure of the forceps of the males, in connection with the venation and with the structure of the antennæ, would alone enable us to arrange the species of the present genus in natural groups. Not having species enough for such a distribution, nor having had an opportunity to study the structure of the male forceps of many species, I am unable to point out their natural affinities. As to an actual subdivision in genera, I do not see any necessity for it at present; in adopting the two genera *Rhypholophus* and *Erioptera*, based upon the nature of the pubescence of the wings, we have done enough, I think, for any purpose of systematic distribution.

The structural affinities between *Rhypholophus* and *Erioptera* are very great. Besides the difference in the nature of the pubescence, I am not able to point out any character, peculiar to one of these genera and foreign to the other; this may be partly owing to our as yet very imperfect knowledge of these genera. The coloring of *Rhypholophus* is decidedly more dull than that of *Erioptera:* gray and grayish-brown are the prevailing colors in it.

The generic name of *Rhypholophus* has been first proposed by Kolenati for a single species, discovered by him in Austria (*Wiener Entom. Monatschr.* 1860, p. 393). It was retained for the same species by Dr. Schiner, in his *Fauna Austriaca*. In the present work the definition of the genus has been enlarged,

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so as to embrace all the *Eriopteræ* the wings of which are pubescent on the whole surface.

Table for determining the species.

1	Discal cell closed, or, if open, it coalesces with the second posterior cell.	2
	Discal cell open; it coalesces with the third posterior cell (Tab. I, fig. 15).	5
2	Wings variegated with gray or brown.	3
	Wings uniformly colored.	4
3	Wings clouded with gray.	1 **nubilus** *O. S.*
	Wings spotted with brown in all the cells.	2 **innocens**, n. sp.
4	Four basal joints of the antennæ pale.	3 **nigripilus**, n. sp.
	Antennæ altogether blackish.	4 **holotrichus**, *O. S.*
5	Thorax reddish, with a distinct black line in the middle.	5 **rubellus**, n. sp.
	Thorax gray, without any distinct stripe.	6
6	Knob of the halteres yellow; wings with a conspicuous stigmatical spot.	6 **meigenii** *O. S.*
	Knob of the halteres infuscated; stigmatical spot not conspicuous.	7 **monticola**, n sp.

Description of the species.

1. R. nubilus O. S. ♂ and ♀.—Cinereus, vittâ thoracis distinctâ, fuscâ; alis griseo nebulosis, cellulâ discoidali clausâ; venis longitudinalibus sixtâ et septimâ versus apicem subparallelis.

Gray, thorax with a distinct brown stripe; wing clouded with grayish; discal cell closed; sixth and seventh longitudinal veins subparallel towards the tip. Long. corp. 0.23—0.27.

Syn. *Erioptera nubila* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 227.

Brownish-gray; a distinct, narrow brown stripe over the thorax; thorax sparsely, abdomen densely clothed with rather long, soft, pale yellowish hairs; antennæ brownish-black, paler at the basis of the flagellum, with short verticils; palpi black; halteres pale, slightly infuscated at the base of the knob, the tip of which is clothed with a short golden-yellow pubescence; feet brownish, coxæ and basis of the femora paler; knees pale; femora with an indistinct brownish band before the tip; wings (Tab. I, fig. 14) grayish-white, with gray nebulosities; they form two more or less marked bands across the apical portion of the wings; a third band passes over the cross-veins; a cloud in the first basal cell; another in the axillary, and some nebulosities in the spurious

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cell; stigma large, brown, square; all the veins dark brown; discal cell present; the seventh longitudinal vein is sinuated in the middle; its latter portion is rather approximated to the sixth vein; the great cross-vein is usually before the middle of the discal cell.

Hab. Washington, D. C.; Trenton Falls, N. Y. Occurs commonly in the spring and in autumn, and may be seen in copulation at both seasons.

R. fascipennis Zett., evidently allied to *R. nubilus*, and originally found in Norway, has been also received from Greenland (Stæger, *Grœnl. Antliater* in Krōjer's *Tidskrift*, etc. 1845, p. 355, 16); its description from Zetterstedt, *Dipt. Scand.* X, p. 3777, is reproduced in the Appendix I.

2. R. innocens, n. sp. ♂ and ♀.—Fuscano-cinereus, vittis thoracis indistinctis; alarum cellulis omnibus crebre fusco-maculatis; cellulâ discoidali clausâ; venis longitudinalibus sixtâ et septimâ divergentibus.

Brownish-gray; stripes of the thorax indistinct; all the cells on the wings densely spotted with brown; discal cell closed; sixth and seventh longitudinal veins divergent. Long. corp. 0.2.—0.25.

Brownish-gray; antennæ and palpi blackish; stripes of the thorax very indistinct; abdomen grayish-brown; male forceps reddish-brown, with strong, short, black horny appendages; halteres somewhat infuscated; feet brownish; tip of the femora darker. Wings grayish, with dense brown dots in all the cells; several larger brown spots along the anterior margin; in the intervals of these spots, the costal and first longitudinal veins are pale yellow. Discal cell closed; the sixth and seventh longitudinal veins are throughout strongly diverging, and thus the axillary cell is much broader at the tip than in the middle.

Hab. Washington, D. C., in April; New Jersey.

In some specimens the spots are less dense in some of the cells, especially in the basal ones.

3. R. nigripilus, n. sp. ♂ and ♀.—Fuscano-cinereus; alis immaculatis; cellulâ discoidali clausâ; venis longitudinalibus sixtâ et septimâ divergentibus; antennarum basi pallidâ.

Brownish-gray; wings immaculate; discal cell closed; sixth and seventh longitudinal veins divergent; basis of the antennæ pale. Long. corp. 0.2—0.22.

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Brownish-gray; palpi blackish; antennæ brown, four basal joints pale yellow; flagellum of the male densely clothed with a long, soft, pubescence; only a few verticillate hairs reach above it; joints elongated, becoming longer towards the tip; flagellum of the female with a much shorter pubescence, and hence, verticillate hairs more distinctly visible; thorax with a brownish tinge above and an indistinct intermediate brownish stripe; two rows of blackish hairs on the posterior part of the mesonotum; coxæ grayish-brown; feet brown, with an appressed pubescence, which appears golden-yellow in a reflected light; trochanters and basis of the femora paler; knob of the halteres yellow; its basis and the stem with a pale grayish tinge; abdomen grayish-brown; horny appendages of the male forceps sharp, black. Wings uniformly gray, with a somewhat more brownish tinge in the region of the stigma; seventh longitudinal vein approximated to the sixth on its anterior half, strongly diverging beyond the middle, and thus the axillary cell much broader at the tip than in the middle; discal cell elongated, narrow; the inner end of the third posterior cell is nearly opposite its middle; all the veins comparatively slender.

Hab. Washington, D. C. Two specimens.

4. R. holotrichus O. S. ♀.—Fuscanus; alis immaculatis; cellulâ discoidali apertâ, cum secundâ posteriori confluens; venis sixtâ et septimâ longitudinalibus convergentibus; antennis nigris.

Brownish; wings immaculate; discal cell open, confluent with the second posterior cell; sixth and seventh longitudinal veins convergent; antennæ black. Long. corp. 0.23.

Syn. *Erioptera holotricha* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 226.

Palpi and antennæ blackish; thorax uniformly pale yellowish-gray above, with some pale hairs; stripes hardly marked at all; halteres yellowish; coxæ and basis of the femora brownish-yellow; the remainder of the feet brown; abdomen grayish-brown, with a pale, erect pubescence. Wings of a uniform pale yellowish-brown color; veins not darker than the ground color; a darker shade in the stigmatic region; discal cell open, confluent with the second posterior cell; the latter portion of the seventh vein is rather approximated to the sixth vein, in such a manner that the axillary cell is not broader at the tip than in the middle.

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Hab. Washington, D. C; three female specimens. One of them has the discal cell closed on one of the wings.

I possess a male specimen which is related to *R. holotrichus*, and very like it, but probably distinct: the discal cell is closed; the veins are darker than the ground color; the antennæ are densely pubescent on one side, and with longer verticils on the other; joints subcylindrical, moderately long; thorax with two brown lines on the hind part of the mesonotum, before the suture, etc.

5. R. rubellus, n. sp. ♂ and ♀.—Thorace rubescente, lineâ intermediâ fuscâ; alis immaculatis; cellulâ discoidali apertâ, cum tertiâ posteriori confluente.

Thorax reddish, with a brown line in the middle; wings immaculate; discal cell open, confluent with the third posterior cell. Long. corp. 0.2—0.23.

Palpi brown; antennæ brownish, the very stout second joint sometimes a little paler; if bent backwards they would hardly reach the root of the wings; those of the male have nothing unusual in their structure; the pubescence is not very conspicuous, and the verticils of moderate length; the antennæ of the female do not differ much from those of the male. Thorax reddish-yellow, sometimes with a grayish bloom; a dark brown stripe in the middle; a row of pale yellow hairs (easily rubbed off) on each side; halteres pale; their knob very slightly, often more distinctly, infuscated; feet brownish, coxæ and basis of the femora brownish-yellow; knees pale. Abdomen brown, with pale yellow hairs; the last segment and the genitals brownish-yellow; forceps of the male rather large, its horny appendages black at the tip. Wings (Tab. I, fig. 15) grayish, darker in the region of the stigma; discal cell open, confluent with the third posterior cell; the latter portion of the seventh longitudinal vein is approximated to the sixth in such a manner that the axillary cell is not broader at the tip than in the middle.

Hab. West Point, N. Y., in numbers; Delaware (Dr. Wilson).

6. R. meigenii O. S. ♂ and ♀.—Thorace vittis nullis; alis stigmate obscure fusco; venis crassis, fuscis; cellulâ discoidali apertâ, cum tertiâ posteriori confluente.

Thorax without stripes; wings with a dark brown stigma; veins stout

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brown; discal cell open, confluent with the third posterior cell. Long. corp. 0.2—0.25.

Syn. *Erioptera meigenii* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 226.

Head grayish, rostrum and palpi brown; antennæ brownish; those of the male, if bent backwards, would not reach much beyond the root of the wings; the joints of the flagellum are elongated, subcylindrical, with a long, soft pubescence; those of the female have the joints shorter, beset with verticils and scattered hairs, but without any conspicuous pubescence. Thorax of a uniform, dull yellowish-gray; beset with yellow hairs on the back, as well as on the pleuræ and on the halteres; the latter with a yellow knob. Abdomen brown, with a soft, long, erect yellowish pubescence; genitals of the male reddish-brown; horny appendages black; feet brownish; coxæ and basis of the femora paler; knees likewise somewhat pale. Wings brownish-gray, shorter and comparatively broader than in *R. rubellus* and *R. monticola;* veins much stouter, dark brown; stigma distinct, brown; usually there is a clearer spot at the end of the first basal cell; discal cell open, coalescent with the third posterior cell; seventh longitudinal vein somewhat arcuated, approximated to the sixth, in its latter portion, in such a manner that the axillary cell is not much broader towards the tip than in the middle; the great cross-vein is usually anterior to the inner end of the discal cell.

Hab. Middle States; not rare.

7. **R. monticola,** n. sp. ♂.—Thorace vittis nullis; alis immaculatis; articulis antennarum maris elongatis, pedunculatis, longe pubescentibus; cellulâ discoidali apertâ, cum tertiâ posteriori confluente; stigmate pallido.

Thorax without stripes; wings immaculate; joints of the antennæ of the male elongated, pedicelled, and with a long pubescence; discal cell open, confluent with the third posterior cell; stigma pale. Long. corp. 0.22?

Head and thorax brownish, with a bluish-gray bloom, somewhat concealing the ground color. The antennæ, if bent backwards, would reach some distance beyond the root of the wings; the joints of the flagellum, beginning with the second, are elongated and narrow, terminating in an elongated point, to which is fastened the following joint; each joint bears, on both

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sides, a tuft of long and soft hairs; no verticils, above this pubescence, are apparent (there are only 13 joints on both antennæ of my specimen, but the tip may be broken off). Palpi blackish; halteres with a somewhat infuscated knob, paler at the root; feet brownish; coxæ and basis of the femora brownish-yellow. Wings uniformly grayish; the stigmatic region very slightly darker; veins brown, comparatively slender; discal cell open, confluent with the third posterior cell; seventh longitudinal vein slightly sinuated in the middle, feebly divergent from the sixth.

Hab. White Mountains, N. H.; a single male specimen, the abdomen of which is broken. The peculiar structure of the antennæ of this species will render it easily recognizable; they must be remarkable for their length, if those of my specimen are imperfect, as I have every reason to suppose they are. The size of this species is about equal to that of the preceding ones; it could not be accurately given, on account of the broken abdomen of my specimen.

Gen. XVII. ERIOPTERA.

Two submarginal cells; four posterior cells; discal cell present or absent. *Wings pubescent along the veins only.* The second longitudinal vein usually originates at a very acute angle, some distance before the middle of the anterior margin; the subcostal cross-vein is at a considerable distance (two or three lengths of the great cross-vein, or more) from the tip of the auxiliary vein. Antennæ 16-jointed. Tibiæ without spurs at the tip; ungues smooth on the under side; empodia distinct.

The rostrum is short; the palpi likewise; their two intermediate joints rather stout. Eyes glabrous, separated above by a broad front; almost contiguous on the under side of the head. The antennæ are generally short, with oval or oblong joints; in some species, the males have the antennæ longer than usual, reaching, if bent backwards, beyond the basis of the abdomen; in such cases the joints of the flagellum are elongated and pedicelled. Thoracic suture well marked, often deep and glossy at the bottom; the longitudinal suture, connecting it with the scutellum, is generally well marked. The feet are of moderate length, comparatively short, usually pubescent, sometimes conspicuously hairy; the intermediate pair (as it was already noticed by Meigen) is shorter than the two other pairs. *Erioptera* has this character in common with the allied genera *Rhypholophus*, *Trimicra*, *Sym-*

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plecta, and *Gnophomyia*. The last joint of the tarsi somewhat projects above and beyond the ungues, not quite so much, however, as in *Trimicra*.

The forceps of the male consists, as usual, of two movable basal pieces, to which horny appendages are fastened, the number and shape of which are variable in different species; in some they appear like a pair of strong hooks (*E. venusta*, Tab. IV, fig. 16); in others several horny branches are visible on each side (*E. vespertina*, Tab. IV, fig. 20, *E. armata*, fig. 14).

The ovipositor of the female is of moderate length in some species and rather long in others. The upper valves are arcuated and pointed; the lower ones, likewise pointed, but less curved, sometimes reach only the middle of the upper ones with their tip, sometimes very nearly the end. The little horny projections noticed by Schummel at the basis of the upper valves of *Symplecta* (*Beiträge*, etc. p. 158), seem to be common to all the *Eriopteræ*.

The wings are more generally broad than narrow; in some species, as in the European *E. atra*, they are shortened in the male, which apparently renders them unfit for flying. The pubescence along the veins is usually long enough to give to the whole wing a hairy appearance; in some species however (as in the North American *E. septentrionis*, or the European *E. ciliaris* Schum.), it is much shorter, and such species might not be recognized for *Eriopteræ*, if the other distinguishing characters were overlooked. (More will be said about such cases under the head of *Trimicra*.) The venation shows considerable modifications in different species; the subdivisions of the genus are principally based upon these differences, which will be explained below.

Besides the North American and European *Eriopteræ* at present known, only three species from all the rest of the world have been published. They belong to Chile, and have been described by Blanchard and Philippi (Blanch. *Gay's Fauna*, VII, p. 343, and Philippi in *Verh. Zool. Bot. Ges. in Wien*, 1865, p. 616).

Mr. Loew (*Bernst. u. Bernsteinfauna*, p. 37) says that he recognizes eight well-defined species of *Erioptera* in amber; he does not describe them.

The name *Erioptera* (from ἔριον, wool, and πτερόν, wing) has

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been introduced by Meigen as early as 1803 (*Illiger's Magazin*, Vol. VI). In the first volume of his principal work (*Systemat. Beschr.* etc. Vol. I, p. 108) he mentions among the characters of the genus that "the wings are pubescent along the veins only." It must not be overlooked, however, that at the time of the publication of this volume he had not seen any of the species with the wings hairy on the whole surface. When he obtained such a species (*E. varia*, Vol. VI, p. 237) he included it in the same genus. Since Meigen, *Erioptera* has been understood by later authors (Macquart, Zetterstedt, Staeger, and Walker) in the same sense, that is, as including the species with the wings pubescent on the whole surface, as well as those pubescent along the veins only.

In 1833 Mr. Curtis (*British Entomol.* 444) proposed the adoption of the genus *Molophilus* for a species which he described as *Molophilus brevipennis*, but which later English entomologists unanimously considered as synonymous with *E. atra* Meig.[1] The characters upon which this genus was established (modified shape of abdomen and thorax, small size of the wings, and large size of the male forceps) do not warrant its retention in the sense of the author, but the name *Molophilus* may be well retained for the subgenus to which *E. atra* belongs.

In 1848 Mr. Rossi (*System. Verz.* etc. p. 12) proposed the generic name of *Cheilotrichia* for the European species having a discal cell (*E. imbuta* and *E. cinerascens*), however without nearer defining this new genus.

In 1860 Mr. Kolenati (*Wien. Entom. Monatschr.* Vol. IV) adopted the genus *Rhypholophus* for a new species, discovered by him in Austria. This name has been retained in the present volume, but in a more extended sense.

[1] The synonymy of *M. brevipennis* with *E. atra* M., admitted by all English authors (compare Westwood, Walker, etc.), is probably based upon a comparison of original specimens. If we hold on to Mr. Curtis's description only, this synonymy may appear doubtful. He (*Brit. Entom.* 557) mentions both *E. atra* and *E. murina* among the species found in England, although in the same article he speaks of *M. brevipennis* as a distinct species. In the description of this species he says that the wings are "straw-colored" at the basis; from the fact that the author, having both sexes before him, does not notice the difference in the length of their wings, one would infer that they are short in both, and this is not the case with *E. atra*, etc.

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In the same year Mr. Rondani (*Prodr. Dipterologiæ Italicæ*, Vol. I) proposed a series of new generic names for certain groups of the genus *Erioptera*. They have already been enumerated above (p. 12), but among that number *Ilisia* alone, with *Erioptera maculata* M. for type, has been described (*Mus. Canestr.* III, p. 91, 1865). The description of the others is to be expected in the volume of Mr. Rondani's work which will treat of the *Tipulidæ*, and which, as far as I am aware, has not yet appeared. This circumstance, as well as my limited knowledge of the European *Eriopteræ*, prevent me from entering in a detailed examination of this distribution.

In 1863 Mr. Lioy (*Atti Inst. Venet.*, 3d series, Vol. IX, p. 224) proposed the genus *Platytoma* (with *E. cinerascens* M. for type) for the *Eriopteræ* with a discal cell and with an incrassated second antennal joint.

Dr. Schiner (*Wiener Entomol. Monatschr.* Vol. VII, 1863, and *Fauna Austriaca, Diptera*, Vol. II, 1864) divided the genus *Erioptera* (in the broadest sense) in four genera, which may be tabulated thus:—

I. Wings pubescent on the whole surface.
   1. A discal cell . . . . . **Rhypholophus.**
   2. No discal cell, and *anterior* branch of the fourth vein forked . . . . **Dasyptera.**

II. Wings pubescent along the veins only.
   1. The fork of the fourth longitudinal vein, and with it, the great cross-vein, are in their usual position; the *posterior* branch of the fourth longitudinal vein is forked . **Trichosticha.**
   2. The fork of the fourth longitudinal vein and with it, the great cross-vein, are much nearer to the root of the wing than the small cross-vein . . . . . **Erioptera.**

Under the head of the genus *Rhypholophus* (comp. p. 139) I have shown why Dr. Schiner's subdivision of the species of Sect. I ("wings pubescent on the whole surface") cannot be retained for the present. In the same way, the subdivision of Section II ("wings pubescent along the veins only") is inapplicable to the North American species. The definition of *Trichosticha*, as given by the author, excludes two North American species (*E. caloptera* and *parva*), and perhaps some European ones (*E. tænio-*

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nota Zett. *Dipt. Scand.* X, p. 3781?) which have the *anterior* branch of the fourth vein forked. Whether we enlarge the genus, so as to admit these species, or whether we leave it in the acceptation of the *Fauna Austriaca*, *Trichosticha* will contain very heterogeneous elements. The genus *Erioptera*, in Dr. Schiner's limited acceptation, is a natural group, which I have retained below. It is to be regretted, however, that the author transferred to this group the name of *Erioptera*, which belongs much more legitimately to his genus *Trichosticha*, as containing Meigen's most numerous and typical species.[1]

In the *Proc. Acad. Nat. Sci. Philad.* 1859 (p. 225), I have indicated the principal groups of the North American *Eriopteræ*. They are substantially the same as those which have been more fully defined in the present publication. If I have retained them in the position of groups or subgenera, it is because, in my opinion, the characters which all these species possess in common constitute between them a link of affinity more important than the structural differences which some of them show. Even the genus *Rhypholophus*, as defined above, proves by the position of its subcostal cross-vein, the manner in which the second longitudinal vein originates, and, in some species, by the arcuated course of the seventh longitudinal vein, a strong affinity to the genus *Erioptera* in its present definition. If I have adopted these two genera, it is because the difference in the pubescence of the wings of both affords a ground of subdivision as simple as easily applicable to all the species at present known. But it remains to be shown yet, whether the difference in this character is indicative of some corresponding modifications in other organs. Another potent reason for not further subdividing the genus *Erioptera* in my case was, my unacquaintance with the European species, the rather small number of the North American ones, and the comparatively large number of subdivisions which they require. For all these reasons I have preferred to indicate the natural affinities existing between the North American *Eriopteræ*, and to distribute them in groups accordingly, leaving these groups in the position of subgenera.

[1] It may be said in favor of Dr. Schiner's nomenclature, that Meigen, in his earlier work (*Klassification*, etc. 1804), has figured *Erioptera atra* as if it was the type of the genus. In his principal work the species are arranged in a different order, and this figure is not reproduced at all.

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The North American species, contained in the genus *Erioptera*, as defined above, may be distributed into the following groups:—

A. The præfurca ends in the second submarginal cell, which is longer than the first: the inner end of the discal cell (or, when it is open, of the cell with which it coalesces) is on the same line with the small cross-vein (Tab. I, fig. 16, 17, 18).

1. The *posterior* branch of the fourth longitudinal vein is forked (in other words, when the discal cell is open, it coalesces with the *second* posterior cell; when it is closed, the inner end of the third posterior cell is nearer the basis of the wing than the inner end of the second).

a. The seventh longitudinal vein is arcuated (converging towards the sixth) in such a manner, that the axillary cell is broader in the middle than near the margin of the wing (Tab. I, fig. 16): subgenus **Erioptera.**

The six species of this subgenus (*E. chlorophylla, straminea, vespertina, septemtrionis, chrysocoma, villosa*) form a very natural group; their venation is exactly the same; their discal cell is open, coalescent with the second posterior cell; their third posterior cell is rather long; their male forceps seems to be built upon the same plan, and consists of two basal pieces, bearing several horny branches each (compare Tab. IV, fig. 20, the forceps of *E. vespertina*); their wings are immaculate, their feet without well-marked bands. Although the above named six North American species have the discal cell open, the mere fact of its being closed would not prevent a new species from being included in this group, if the agreement in the other characters was sufficient. The present group almost answers to Dr. Schiner's genus *Trichosticha;* but it seems to me that *Erioptera* is a more appropriate name for it, as it will probably include the majority of the species, as well as the most typical forms, of the genus *Erioptera* in the sense of Meigen's principal work.

b. The seventh longitudinal vein is straight, diverging from the sixth; hence the axillary cell is much broader near the margin of the wing than in the middle; discal cell closed.

* The fork of the posterior branch of the fourth longitudinal vein (containing the third posterior cell) has the usual structure, that is, consists of two gently arcuated branches (Tab. I, fig. 17): subgenus **Acyphona.**

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The three species belonging here (*E. venusta*, *graphica*, and *armillaris*) are very closely allied. They have handsomely variegated wings, and bands on the feet differing from the ground color. The male forceps has a very different structure from that of the preceding and of the following groups: it has, on each of the basal pieces, a single, strong, hook-shaped horny appendage (Tab. IV, fig. 16, *a*, *b*; forceps of *E. venusta*). The lower valves of the ovipositor are as long as the upper ones.

** The fork of the posterior branch of the fourth longitudinal vein (containing the third posterior cell) has an angular anterior branch which emits a stump of a vein inside of the discal cell (Tab. I, fig. 18): subgenus **Hoplolabis.**

Only a single North American species, *E. armata*, belongs to this group. Its forceps is entirely distinct in structure from that of the preceding group (Tab. IV, fig. 14*a*, 14); its wings are likewise variegated with brown, but its feet are of a uniformly pale color.

2. The *anterior* branch of the fourth longitudinal vein is forked (in other words, when the discal cell is open, it coalesces with the *third* posterior cell); when the discal cell is closed the inner ends of the second and third posterior cells are nearly in one line: subgenus **Mesocyphona.**

E. caloptera Say, and *E. parva* O. S. belong here; both are distinguished by the above-mentioned peculiarities in the venation, and their relationship is further proved by the resemblance in the coloring of their body. The position of the two brown stripes on the thorax is quite peculiar, and not to be found in the other *Eriopteræ*; the feet have dark bands. The forceps of *E. caloptera* is represented on Tab. IV, fig. 15. The discal cell of this species is generally, that of *E. parva* always open. When closed in the former species, the shape of the discal cell is such that the inner ends of the second and third posterior cells are in one line; this is far from being the case with the other *Eriopteræ* with a closed discal cell, as *E. venusta*, *graphica*, *armata*, etc. The shape of the discal cell in these latter species evidently shows that it is the *posterior* and not the *anterior* branch of the fourth vein which is forked.

B. The præfurca ends in the first submarginal cell, which is longer than the second; the inner end of the discal cell (or rather, as it is always open, of the second posterior cell), as well as the great cross-

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vein, are not in one line with the small cross-vein, but much nearer to the root of the wing (Tab. I, fig. 19): subgenus **Molophilus.**

The peculiarities of the venation of this group are: 1. That the second longitudinal vein emits the third, not from its main stem, as usual, but from its posterior branch (as in some species of *Amalopis*); hence the first submarginal cell is longer than the second; the latter, in all the species which I have seen, has its inner end in one line with the inner end of the first posterior cell, both inner ends being nearly square; the first submarginal cell has usually a somewhat rounded inner end, and the marginal cross-vein is but a short distance beyond it; in *E. ursina* nearly in one line with it; 2. That the first bifurcation of the fourth longitudinal vein takes place at a considerable distance before the small cross-vein, and that the great cross-vein is also removed backwards to a corresponding distance; the consequence is, that the inner ends of the second and fourth posterior cells are nearer to the basis of the wing than the inner ends of the first posterior and of the submarginal cells. The discal cell seems to be always open (this is the case with the North American species, as well as with the European species, which I find mentioned in the authors). The third posterior cell is rather long in most species, and has its inner end more or less opposite that of the first posterior cell; in *E. ursina*, however (and probably in the related European species), it is much shorter.

Dr. Schiner has retained the name of *Erioptera* for this subdivision, but this name is more properly applied to another group. As *Molophilus*, a generic name proposed by Mr. Curtis for a species of this group with very short wings, unfit for flying, cannot well be retained in this narrow sense, we may apply it to the whole group.

Table for determining the species.

1	The præfurca ends in the second submarginal cell (Tab. 1, fig. 16, 17, 18).	2
	The præfurca ends in the first submarginal cell (Tab. I, fig. 19).	13
2	The discal cell, when open, coalesces with the *second* posterior cell (Tab. I, fig. 16); when closed, the inner ends of the second and third posterior cells are not in one line, the inner end of the latter being anterior (Tab. I, fig. 17, 18).	3
	The discal cell, when open, coalesces with the *third* posterior cell; when closed, the inner ends of the second and third posterior cells are nearly in one line.	12

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3 { Discal cell open; seventh longitudinal vein arcuated in such a manner that the axillary cell is broader in the middle than near the margin (Tab. I, fig. 16). 4
Discal cell closed; seventh longitudinal vein straight, diverging from the sixth, and, hence, the axillary cell much broader near the margin than in the middle (Tab. I, fig. 17, 18). 9

4 { Knob of the halteres yellow. 5
Knob of the halteres infuscated. 1 **septemtrionis** *O. S.*

5 { Body and wings yellow or green. 6
Body and wings brown. 2 **villosa** *O. S.*

6 { Cross-veins not infuscated, feet yellow. 7
Cross-veins infuscated, feet conspicuously clothed with black hairs. 3 **chrysocoma** *O. S.*

7 { Front and humeri with sulphur yellow marks, the remainder of the head and of the thorax being of a saturated reddish or brownish-yellow. 4 **vespertina** *O. S.*
Whole body pale green or pale yellow. 8

8 { Body pale green. 5 **chlorophylla** *O. S.*
Body pale yellow. 6 **straminea**, n. sp.

9 { No stump of a vein inside of the discal cell; femora with brown bands. 10
A stump of a vein inside of the discal cell (Tab. I, fig. 18); femora without brown bands. 10 **armata** *O. S.*

10 { Wings with a broad brown band and a large brown spot before it, nearer the basis (Tab. I, fig. 17). 7 **venusta** *O S.*
Wings with a very narrow brown band and numerous brown spots and marks. 11

11 { Prevailing color of the body and of the wings yellowish. 8 **armillaris**, n. sp.
Prevailing color of the body and of the wings brownish. 9 **graphica** *O. S.*

12 { Wings brownish, with numerous white spots. 11 **caloptera** *Say.*
Wings pale grayish, with small dark spots along the margin, at the tip of the longitudinal veins. 12 **parva** *O. S.*

13 { Prevailing color of the body yellow. 13 **pubipennis** *O. S.*
Prevailing color of the body brown or black. 14

14 { Size from 0.2 to 0.25; color brown. 15
Size hardly 0.1; color black. 16 **ursina** *O. S.*

15 { Antennæ altogether brownish. 14 **hirtipennis** *O. S.*
Two basal joints of the antennæ yellowish. 15 **forcipula**, n. sp.

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Description of the species.

A. The præfurca ends in the second submarginal cell, which is longer than the first; the inner end of the discal cell (or, when it is open, of the cell with which it coalesces) is on the same line with the small cross-vein.

1. The *posterior* branch of the fourth longitudinal vein is forked.

a. Seventh longitudinal vein arcuated, converging towards the sixth (Tab. I, fig. 16): subgenus **Erioptera** (compare above, page 151).

1. E. septemtrionis O. S. ♂ and ♀.—Fuscano-ochracea, alis immaculatis, venarum villosie perbrevi, halteres capitulo infuscato.

Brownish-ochraceous, wings immaculate, the pubescence of the veins very short, the knob of the halteres brown. Long. corp. 0.2—0.25.

Syn. *Erioptera septemtrionis* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 226.

Body ochraceous, more or less tinged with brownish; front infuscated in the middle; palpi brown; antennæ brownish, more or less pale at the basis; thorax brownish above, with more or less sulphur yellow in the humeral region; a brown stripe, more or less distinct, along the middle of the mesonotum and of the collare; pleuræ usually pale, with a brown stripe, running from the collare to the root of the halteres; in some specimens, the pleuræ are brownish; knob of the halteres dark brown; feet brownish-yellow; abdomen brownish above, venter paler. Wings immaculate; veins brownish, their pubescence very short, not long enough by far to reach from vein to vein and thus to cover the surface of the cells.

Hab. Maine (Packard); Sharon Springs, N. Y.; seems to be more common in the north. I possess a male from Washington, D. C., which is altogether brownish, humeri yellowish, forceps reddish; a female of very large size (locality uncertain) has the same dark coloring. I believe that they belong to *E. septemtrionis*, which can always be distinguished by the dark knob of the halteres and the short pubescence of the wings.

2. E. villosa O. S. ♂.—Fusca, alis fuscescentibus, conspicue fusco-villosulis, halteribus flavis.

Brown, wings brownish, with conspicuous brown hairs; halteres yellow. Long. corp. 0.25.

Syn. *Erioptera villosa* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 226

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Brown; antennæ and palpi of the same color; a sulphur yellow spot on the humeri, extending towards the root of the wings; halteres yellow; their tip with a fine, silky, golden yellow pubescence; abdomen with a long, soft, pale brownish-yellow pubescence; genitals paler than the abdomen, yellowish-brown; the horny appendages of the male forceps are pale, with their tips only black. Feet brownish-yellow, rather stout, pubescent with brownish hairs, which look golden in a reflected light. Wings with a somewhat dusky tinge; pubescence of the veins long, brown.

I possess a single male specimen, captured by myself in the Middle States of the Union; the precise locality I am unable to give.

3. E. chrysocoma O. S. ♂ and ♀.—**Flava, alis flavescentibus, punctis paucis fuscis; pedibus conspicue fusco-villosulis.**

Yellow, wings yellowish with a few brown dots; feet with a conspicuous brown pubescence. Long. corp. 0.2—0.22.

SYN. *Erioptera chrysocoma* O. SACKEN, Proc. Ac. Nat. Sc. Phil. 1859, p. 226.

Bright yellow; palpi brownish; antennæ brownish, basal joints yellow; those of the male have a dense, even pubescence on one side, and long verticils on the other. Thorax somewhat more saturate-yellow above, in well-preserved specimens with obsolete hoary lines, visible in a reflected light, and indicative of the intervals of the ordinary stripes; halteres yellow; abdomen slightly tinged with brownish above; male forceps yellow, the horny appendages likewise; when the forceps is open, a pair of internal horny appendages become perceptible, the tip of which is black. The feet are rather stout, and clothed with long brown hairs, which makes them look altogether brown; the basis of the femora on the front feet and nearly the whole femora of the other two pairs, except their tip, are yellow, and devoid of this brown pubescence; the front feet are conspicuously elongated. Wings with a yellowish tinge, purely yellow along the anterior margin, and more brownish behind; the costa has a fringe of golden hairs, especially towards the apex; small brown dots at the tip of the first longitudinal vein and on the marginal cross-vein; still smaller ones on the subcostal cross-vein and at the tips of all the longitudinal veins; the central cross-veins are dark brown,

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whereas the other veins are yellowish-brown; costa and first longitudinal veins yellowish.

Hab. Washington, D. C., and farther north; not rare.

4. E. vespertina O. S. ♂ and ♀.—Ochracea, thorace superne saturate rufo-fusco; humeris sulphureo-flavis; alis immaculatis; venis pallidis; halteribus flavis.

Ochraceous, thorax of a saturate reddish-brown above; humeri sulphur yellow; wings immaculate; veins pale; halteres yellow. Long. corp. 0.22—0.25.

Syn. *Erioptera vespertina* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 226.

Ochraceous, with a slight brownish tinge; front sulphur yellow, brown in the middle; rostrum yellowish, palpi brownish; antennæ brownish; two basal joints somewhat pale, but infuscated at the tip; basis of the flagellum likewise pale. Thorax reddish-brown above; the usual four stripes hardly indicated by faint, yellow, dividing lines; pleuræ yellowish, very slightly hoary; humeri sulphur yellow; halteres yellow; feet slender, brownish-yellow; abdomen brownish-ochraceous; horny appendages of the male forceps (Tab. IV, fig. 20) brown at the tip. Wings with a slight grayish tinge; veins pale.

Hab. Washington, D. C.; Florida; Wisconsin (Kennicott); not rare.

5. E. chlorophylla O. S. ♂ and ♀.—Pallide viridis tota.

Altogether pale green. Long. corp. 0.2—0.25.

Syn. *Erioptera chlorophylla* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 226.

Body pale green; antennæ, halteres, veins, genitals, etc. likewise; the eyes alone being black. The ovipositor of the female is rather long; the upper valves but little curved (wing, Tab. I, fig. 16).

Hab. Middle States; not rare.

6. E. straminea, n. sp. ♂ and ♀.—Pallide flava tota.

Altogether pale yellow. Long. corp. 0.2—0.23.

The whole body, including the wing-veins, is uniformly pale yellow; the last tarsal joint slightly infuscated.

For a long time I took this species for a mere variety of *E. chlorophylla;* but the upper valves of its ovipositor are shorter and much more arcuated.

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b. Seventh longitudinal vein straight, diverging from the sixth; discal cell closed.

* The fork of the posterior branch of the fourth longitudinal vein consists of two gently arcuated branches: subgenus **Acyphona** (compare p. 152).

7. E. venusta O. S. ♂ and ♀.—Alis flavescentibus, fasciis duabus fuscis; femora ante apicem annulo fusco.

Wings yellowish, with two brown bands; femora before the apex with a brown band. Long. corp. 0.23.—0.25.

Syn. *Erioptera venusta* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 227.

Body brown; antennæ paler on their basal half; thorax reddish above, with a faint indication of a double stripe in the middle; genitals reddish-yellow; halteres and feet pale yellow; femora with a brown band before the tip; on the front femora there is an indication of a second band about the middle; wings (Tab. I, fig. 17) pale yellowish, with two brown bands; the first begins at the origin of the præfurca, is broadest in the middle, and reaches the posterior margin so as to include the tip of the seventh longitudinal vein; the other band lies almost entirely beyond the central cross-vein; it runs through from the anterior to the posterior margin; it is almost of equal breadth; it includes a pale spot at each end; in some specimens, the spot at the anterior margin is connected with the yellow of the apical portion of the wing; in this case a brown spot at the tip of the first longitudinal vein is isolated from the band; the cross-vein, closing the discal cell, is clouded; the tip of the anterior branch of the second vein and the tips of both branches of the fork which includes the third posterior cell, and the subcostal cross-vein are likewise clouded.

Hab. Middle States; common (I have seen specimens from New York, Virginia, Georgia, Illinois, Connecticut, etc.).

8. E. armillaris, n. sp. ♂ and ♀.—Alis flavescentibus, fasciâ mediâ angustâ et nebulis parvis in venarum initio et apice sitis, fuscis; femora pallida, fusco-annulata, vel fusca, pallido-annulata.

Wings yellowish, with a narrow brown band in the middle, and small brownish clouds at the origins and at the tips of the veins; femora pale, with brown bands or brown with pale bands. Long. corp. 0.23—0.25.

Body brown; antennæ paler on their basal half; thorax reddish above, with a faint indication of a double stripe in the middle;

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genitals reddish-yellow; halteres yellow; feet pale yellow; the femora of some specimens are pale yellow, with a brown band before the tip; in other specimens they are dark brown, with a pale band; wings yellowish; a narrow brown band runs along the central cross-veins, and generally does not go beyond the great cross-vein; sometimes, however, it is connected with a cloud at the end of the anal cell; small brown clouds at the tip of all the veins (except the third), on the subcostal and the discal cross-veins, at the origin of the præfurca, and the inner end of the third posterior cell; the middle portion of the fifth longitudinal vein infuscated and surrounded by a more or less extended cloud, which sometimes expands so as to coalesce with the spots at the origin of the præfurca and at the tip of the seventh vein, and forms a band not unlike the inner band of *E. venusta*.

Hab. Trenton Falls, N. Y.; Washington, D. C., etc.

This species is in all respects similar to *E. venusta*, only the brown picture of the wings is less extended. If we imagine some of the spots more expanded, two bands, perfectly similar in shape to those of *E. venusta* will be formed. Still, although I have seen numerous specimens of *E. venusta*, I found its picture rather constant, and I have not observed any specimens with brown femora, as they occur in *E. armillaris*. The following species—*E. graphica*—shows also the most striking analogy to *E. armillaris* in the distribution of the spots on the wings; only the body as well as the wings is a shade darker brown. If *E. graphica* did not exist, I would feel less hesitation about uniting *E. armillaris* and *venusta;* but *E. graphica* is, to all appearances, nothing but a dark colored *E. armillaris*, and anybody would hesitate to consider *graphica* and *venusta* as the same species. I invite the attention of collectors to these three species.

9. E. graphica O. S. ♂ and ♀.—Fusca, alis fuscescentibus, fasciâ mediâ angustâ et nebulis plurimis fuscis; in margine antico majoribus, in postico parvis; femora fusca, annulo ante apicem pallido.

Brown, wings brownish, with a narrow brown band in the middle, and numerous brown clouds; larger ones along the anterior, smaller ones along the posterior margin. Long. corp. 0.25—0.27.

Syn. *Erioptera graphica* O. Sacken, Proc. Ac. Nat. Sc. Phila. 1859, p. 227.

Body brownish; antennæ paler at the basis; thorax yellowish-gray above, with a faint brown stripe, divided in two by a longi-

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tudinal grayish line, in the middle; the sides of the mesonotum and two stripes on the pleuræ, dark brown; abdomen brown; halteres pale; femora dark brown, except the basis of the anterior ones, and a pale band some distance before the tip; the tips of the tibiæ and of the tarsi likewise infuscated; wings with a slight brownish-gray tinge; a brown band runs along the central cross-veins; broad at the anterior end, it soon becomes narrow; tips of all the veins with small gray clouds; similar clouds on the discal cross-vein, and at the inner end of the third posterior cell: the clouds at the tip of the first and of the second longitudinal veins are larger; the fifth longitudinal vein is infuscated and clouded at the two intervals before the great cross-vein; the cloud on the second infuscation, in connection with a large cloud on the anterior margin and another cloud at the tip of the seventh longitudinal vein, form an interrupted transverse band; the veins are infuscated, wherever there is a cloud upon them; in the intervals of the clouds the veins are yellowish.

Hab. Washington, D. C. Caught in numbers.

The position of the clouds is exactly like that in the preceding species; only the tinge of the wings is darker, and the clouds larger and darker. The coloring of the body of both species is also very similar; only that of *E. graphica* is darker (compare the observations at the end of the preceding species).

** The fork of the posterior branch of the fourth longitudinal vein (containing the third posterior cell) has an angular anterior branch, which emits a stump of a vein inside of the discal cell: subgenus **Hoplolabis** (comp. p. 152).

10. E. armata O. S. ♂ and ♀.—Fuscana; abdominis segmentorum margines postici pallidi; pedes pallidi; alæ fusco maculatæ; venæ truncus abruptus, in cellulam discoidalem porrectus.

Brownish; hind margins of the abdominal segments pale; feet pale; wings with brown spots; a stump of a vein inside of the discal cell. Long. corp. 0.23—0.25.

Syn. *Erioptera armata* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 227.

Body brownish; thorax yellowish-gray above; stripes indistinct; knob of the halteres infuscated; abdomen brown, hind margins of the segments pale; feet yellowish. Wings (Tab. I, fig. 18) with five or six brown spots along the anterior margin;

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the first, a small dot, is on the humeral cross-vein; the second at the origin of the præfurca; it does not reach the costa; the third runs from the costa, across the subcostal cross-vein to the præfurca; the fourth spot is large, and lies between the costa and the inner end of the first submarginal cell; the fourth, equally large, covers the tip of the first longitudinal vein; cross-veins infuscated and clouded; tips of all the longitudinal veins, except the third, with small brown clouds; the third posterior cell is square at the inner end, and emits a long stump of a vein from the angle of this square inside of the discal cell; in some specimens this stump reaches the opposite side of the cell, and thus divides it in two.

Hab. Washington, D. C.; New York; Illinois (LeBaron); Wisconsin (Ulke); usually in the spring.

The male forceps of this species (Tab. II, fig. 14, 14 *a*) is distinguished by long slender horny processes (compare the description in the explanation of the plates).

2. The *anterior* branch of the fourth longitudinal vein is forked (in other words, when the discal cell is open, it coalesces with the *third* posterior cell); when the discal cell is closed the inner ends of the second and third posterior cells are nearly in one line: subgenus **Mesocyphona** (compare p. 152).

11. E. caloptera Say. ♂ and ♀.—Alis fuscanis, guttis, guttulisque limpidis.

Wings brownish, with hyaline spots and smaller dots. Long. corp. 0.15—0.25.

Syn. *Erioptera caliptera* Say, Journ. Ac. Nat. Sc. Phil. III, p. 17, 1.
Erioptera caloptera Wied. Auss. Zw. I, p. 23, 1.
Erioptera caloptera O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 226.

Brownish-yellow, thorax with a whitish tinge above, and with two distinct, dark brown stripes; similar stripes on the pleuræ; one above, another in the middle, and a third, less distinct one, along the coxæ; feet whitish, with a brown band before the tip of the femora. Wings brownish (which color is more intense on their anterior portion), covered with numerous white spots; those along the margins are larger, especially on the anterior one; those in the apical portion of the wing in the submarginal and posterior cells (except the fourth) are smaller, numerous, and crowded together; a hyaline band over the central cross-veins.

11 August, 1868.

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Hab. United States, common; occurs also in Cuba.

The discal cell of this species is sometimes closed, but generally open.

12. E. parva O. S. ♂ and ♀.—Alis sublimpidis, nebulis in margine parvis novem vel decem obscuris.

Wings subhyaline, nine or ten small dark clouds along the margin. Long. corp. 0.1♀—0.2.

Syn. *Erioptera parva* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 227.

Brownish-yellow, thorax paler above, with two distinct dark brown stripes; similar stripes on the pleuræ; feet whitish, with an obscure band before the tip of the femora. Wings with a grayish tinge; small gray clouds along the anterior and posterior margins, at the tips of all the longitudinal veins; those of the anterior margin somewhat larger; central cross-veins clouded. Discal cell open, coalescing with the third posterior cell.

Hab. Washington, D. C.; Orange, N. J., in June, not rare; Dalton, Ga. The coloring of its body is very like that of *E. caloptera*.

B. The præfurca ends in the first submarginal cell, which is longer than the second; the inner end of the discal cell (or rather, as it is always open, of the second posterior cell), as well as the great cross-vein, are not in one line with the small cross-vein, but much nearer to the basis of the wing (Tab. I, fig. 19): subgenus **Molophilus** (compare p. 153).

13. E. pubipennis O. S. ♀.—Flava, fronte et humeris sulphureo-flavis; pedibus anticis fuscis; alis immaculatis, costa et apice flavo-villosis.

Yellow, front and humeri sulphur-yellow; front feet brownish; wings immaculate, costa and apex with a golden-yellow fringe of hairs. Long. corp. 0.2.

Syn. *Erioptera pubipennis* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 228.

Body of a saturate yellow; front and margin round the thorax sulphur yellow; this margin, if viewed in a certain light, has a hoary reflection; mesonotum reddish-yellow; palpi brown; antennæ pale, brownish at the tip; halteres pale yellow; fore feet brown, clothed with brown hairs; the two other pairs yellow, with the tips of the tibiæ and the tarsi brown; wings grayish, thickly hairy; costa yellow, with a fringe of golden-yellow hairs,

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running also round the apex. The third posterior cell is somewhat longer than the first, nearly of the same length with the second marginal cell.

Hab. Washington, D. C.

The description is drawn from a number of female specimens. I possess several male specimens from Pennsylvania, which are somewhat darker in coloring; the antennæ are very long, but little shorter than the body; brown, basal joints yellow; the long cylindrical joints of the flagellum clothed with long hairs; the sulphur yellow on the front and the humeri is much less striking; the halteres are slightly brownish and the pubescence of the anterior margin of the wings has a more brownish tinge. I am uncertain whether these specimens belong to the same species.

14. E. hirtipennis O. S. ♀.—Fusca, griseo-pruinosa, antennis pallide fuscis; alæ immaculatæ, pube nigrescente.

Brown with a grayish bloom, antennæ pale brown; wings immaculate, with a blackish pubescence. Long. corp. 0.2—0.25.

Syn. *Erioptera hirtipennis* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 228.

Rostrum and palpi brown; antennæ brownish or blackish; second joint generally slightly paler; joints of the flagellum short subcylindrical; front with a gray bloom and some scattered hairs, which, in a certain light, have a golden-yellow reflection. Thorax dull grayish-brown; stripes obsolete; in somewhat immature specimens a very indistinct pale longitudinal line is sometimes perceptible; humeri with an inconspicuous pale yellow spot; halteres brownish, their basis pale; abdomen grayish-brown, with a golden yellow pubescence; ovipositor ferruginous; feet blackish, coxæ and basis of the femora paler; wings immaculate, with a blackish pubescence; root of the wings pale.

Hab. Washington, D. C.; Maryland; the present description was drawn from four fresh specimens, which I found in Orange, N. J.

15. E. forcipula, n. sp. ♂ and ♀.—Fusca, mesonoto pallide fuscano, antennis fuscis, basi pallidis; abdomen fuscum, genitalia flavida; alæ immaculatæ, pube fuscana.

Brown, mesonotum pale brownish, antennæ brown, pale at the basis; abdomen brown, genitals yellowish; wings immaculate, with a brownish pubescence. Long. corp. 0.2—0.25.

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Rostrum and palpi brown; antennæ brown, two basal joints pale yellowish; joints of the flagellum in the female rather elongated, almost cylindrical; in the male they are shorter; front brownish, with a gray bloom (the male has some yellow on the vertex). Thorax pale brownish above; stripes generally obsolete in front, sometimes visible on the posterior portion of the mesonotum; humeri with rather conspicuous sulphur-yellow spots; halteres infuscated, except their basis, which is pale; feet brown, coxæ and basis of the femora yellowish; abdomen brown, with golden-yellow hairs; its tip, including the male forceps, is yellowish; horny appendages of the male dark brown; ovipositor ferruginous; wings immaculate, with pale veins and a brownish pubescence.

Hab. South Orange, N. J.; three specimens.

This species is most closely related to the former, but will be easily distinguished by its paler coloring, the yellowish basal joints of its antennæ, the more elongated joints of the flagellum in the female, the more distinct sulphur yellow spot on the humeri, etc.

In both of these species the males seem to be comparatively rare. Having found recently a male specimen of *E. forcipula*, I examined its forceps, which has a very peculiar structure: rather large, broad at the basis, showing several coriaceous appendages, the outer ones linear, the inner ones somewhat foliaceous; each half of the forceps bears a pair of brown horny appendages, curved against each other, so as to form a separate little forceps, which opens and shuts when the large forceps is in motion.[1]

16. E. ursina O. S. ♂.—Nigrescens, pilis longis nigris vestita.

Blackish, clothed with long black hairs. Long. corp. 0.08.

Syn. *Erioptera ursina* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 228.

Grayish-black; the body, the veins, and the posterior margin of the wings covered with long, black hairs, which appear golden in a reflected light; halteres, antennæ, and feet black. The venation is peculiar and different from that of the two preceding

[1] *E. forcipula* has been added since this volume is in press; for this reason it has not been comprised in the numerical data given on pages 35 and 36.

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species; the marginal cross-vein is almost on one line with the inner end of the first submarginal cell; the latter is but very little anterior to the inner end of the second submarginal and first posterior cells; the third posterior cell is much shorter than the first (the venation can of course be perceived only when the hairs are rubbed off).

Hab. Washington, D. C., and Maryland; forms clouds in the spring near running waters. This species seems to be very like the European *E. murina* Meig.; but I have had no opportunity for a comparison.

Gen. XVIII. TRIMICRA.

Two submarginal cells; four posterior cells; a discal cell; the second longitudinal vein originates, at a more or less acute angle, before the middle of the length of the wing and a considerable distance (more than the breadth of the wing) before the tip of the auxiliary vein; the subcostal cross-vein is at a considerable distance (three lengths of the great cross-vein, or more) from the tip of the auxiliary vein; seventh longitudinal vein straight. Wings and their veins glabrous (Tab. II, fig. 1). Antennæ 16-jointed; *three last joints of the flagellum abruptly smaller.* Tibiæ without spurs at the tip; ungues small, smooth on the under side, inserted under a projection of the last tarsal joint; empodia small, but distinct. Forceps of the male with large, incrassated basal pieces, and a double claw-shaped horny appendage fastened to them on each side; ovipositor with flattened, curved, pointed upper valves and short lower ones.

Rostrum and palpi short; eyes glabrous, separated above by a moderately broad front and almost contiguous below. Antennæ of moderate length, or rather short, as they would hardly reach the root of the wings, if bent backwards; joints of the flagellum, especially the basal ones, short, oblong or subcylindrical, with moderate verticils; the three last joints of the antennæ are abruptly smaller than the preceding ones (this peculiarity may be perceived even in dry specimens). Feet comparatively long, more or less clothed with hair, sometimes conspicuously hairy; intermediate pair comparatively short; femora sometimes conspicuously incrassated at the tip. The position of the ungues under a projection of the last tarsal joint, which likewise exists in some degree in *Erioptera* and *Symplecta*, is particularly striking here. The forceps has very stout basal pieces, closely applied to each other (and not with an open interval between them, as in *Symplecta*). The wings (Tab. II, fig. 1) are rather long and

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comparatively narrow. The venation has nothing abnormal, and strikes at once by the straight course and the parallelism of the veins ending in the apex of the wing, between the latter portion of the first longitudinal vein and the second posterior cell; hence the rather long first and second submarginal and first posterior cells have parallel sides and are narrow and linear. Discal cell subtriangular; the great cross-vein a little anterior to it; the auxiliary vein ends opposite the marginal cross-vein; the first longitudinal vein some distance beyond it; the origin of the second longitudinal vein is some distance before the middle of the anterior margin; the præfurca is straight, and its curvature near its origin is none or almost none; petiole of the first submarginal cell shorter than the great cross-vein; the marginal cross-vein is a trifle beyond the inner end of the first submarginal cell; the sixth as well as the seventh longitudinal veins are nearly straight. The stigma is almost imperceptible, hardly marked at all. The venation of the European *T. pilipes* and the North American *T. anomala* are exactly alike.

Trimicra forms a natural transition between *Erioptera* and *Chionea* on one side and *Symplecta* on the other. The position of its subcostal cross-vein and of the origin of the second longitudinal vein proves its relationship to *Erioptera*. *Symplecta* possesses the same characters, somewhat weakened however; its præfurca is more distinctly arcuated near its origin, and this origin is somewhat less near the basis of the wing; moreover it has, like *Trimicra*, the great cross-vein somewhat anterior to the discal cell. But although the sinuated course of the seventh longitudinal vein, and the structure of the male genitals sufficiently distinguishes *Symplecta*, both genera are very closely allied. The European species, *Symplecta stictica* and *similis*, are very like *Trimicra* in outward appearance, but I have had no opportunity to examine the structure of their forceps. Among the *Eriopteræ* with short hairs along the veins some might perhaps be mistaken for *Trimicræ*. But the pubescence of the wing-veins of this genus is much more minute, hardly perceptible; the seventh longitudinal vein runs straight to the posterior margin, the axillary cell being broadest near the margin; the inner ends of the second and third posterior cells are in one line, making it appear doubtful which of the branches of the fourth longitudinal vein is furcate. The *Eriopteræ* of the section

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where the short pubescence occurs (subg. *Erioptera* nob.) have the seventh vein arcuated, its tip being approximated to the tip of the preceding vein, the third posterior cell is longer than the second, showing distinctly that it is the posterior branch of the fourth longitudinal vein which is forked, etc. I have before me a European *Erioptera* of that kind (*Limnobia ciliaris* Schum. ?), the appearance of which, at first sight, is very deceptive, as its venation in most points, and its coloring, are not unlike those of *Trimicra*.

When I first established this genus (*Proc. Acad. Nat. Sci. Philad.* 1861, p. 290) upon a small North American species, I was not at all aware of the existence of the European *T. pilipes* Fab., a much larger and more striking form, the true type of the genus. All the characters, indicated by me at that time as distinctive of the genus, are to be found strongly marked in *T. pilipes*. The genus *Gnophomyia* of the *Fauna Austriaca* (*Diptera*) is not *Gnophomyia* O. S., but *Trimicra*.

Besides Europe and North America, *Trimicra* has been found in Mexico, South America, South Africa, and Australia. I have seen a species from Mexico in Mr. Bellardi's collection; one from Montevideo in the Berlin Museum. *Limnobia hirtipes* Walk. (*List*, etc., I, p. 50), from the Swan River, Australia, and *Gnophomyia inconspicua* Loew, from Caffraria (*Berl. Entom. Z.* 1866, p. 59), are *Trimicræ*. Dr. Schiner (*Reise d. Novara*, etc., pp. 42, 43) describes two species from the island of St. Paul (*T. antarctica* and *T. st. pauli*), and one (*T. sidneyensis*) from Sidney. Those species which I have seen, although coming from distant parts of the world, are very much alike in coloring.

The name (from τρεῖς, three, and μικρὸς, small) alludes to the small size of the terminal joints of the antennæ.

Description of the species.

1. T. anomala O. S.—Fuscano-cinerea, thorace lineis tribus fuscis, alis immaculatis, modice fuscescentibus; antennis nigris.

Brownish-gray, thorax with three brown lines, wings immaculate, somewhat tinged with brownish; antennæ black. Long. corp. 0.3—0.35.

Syn. *Trimicra anomala* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1861, p. 290.

Brownish-gray; vertex brownish in the middle, with a dark line extended over the front; the latter yellowish on the sides,

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along the orbits of the eyes; antennæ and palpi blackish-brown; the space occupied by the usual stripes on the mesonotum is brownish, with three dark brown lines; the intermediate one is especially distinct; the lateral ones are curved anteriorly and extended beyond the suture posteriorly; the humeral region is yellowish; pleuræ hoary below, with a brown stripe between the collare and the root of the halteres; metathorax brownish, with a hoary bloom; halteres yellowish, sometimes infuscated; feet brownish, tip of the femora broadly, tip of the tibiæ only a little infuscated; abdomen brown, the lateral margins, as well as those of the single segments, paler; forceps of the male reddish. Wings slightly tinged with brownish; cross-veins with hardly perceptible brownish clouds.

Hab. Washington, D. C.; New Rochelle, N. Y.; Newport, R. I.; in June, also in August and September; always near water.

Gen. XIX. CHIONEA.

No wings. Antennæ 6-jointed, structure abnormal; feet stout, hairy; abdomen short; last segment very large, subglobular, inclosing the basis of the forceps; the latter comparatively large and strong, with strong claw-shaped appendages; ovipositor pointed; the upper and lower valves divaricated at the basis.

Head rounded, front convex; rostrum short; palpi with four short joints; first joint of the antennæ cylindrical, elongated; the second of equal length, club-shaped at the tip; the third short conical; the remainder of the antenna slender, filiform, with three joints;[1] joints of the scapus pubescent, those of the flagellum with rather long verticils. Thorax comparatively small; the transverse suture visible at the sides only; scutellum short and broad; last abdominal segment very large, rounded on the under side, inclosing the basis of the forceps. Feet stout, comparatively long, hairy; coxæ large; the hindmost femora (according to Dr. Harris) are very thick and somewhat bowed in the males; tibiæ without spurs at the tip; empodia distinct; ungues smooth; the fourth joint of the tarsi is somewhat incrassated on the under side, at the basis. Halteres short, with

[1] For the number of antennal joints I rely upon Dr. Schiner (*Fauna Austr. Dipt.* II, p. 573), who had seen living specimens. It seems to me that I can count four joints in the only specimen in my possession.

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a large knob. "The body of the female ends in a sword-shaped borer, resembling that of a grasshopper." (Harris.)

The relationship of *Chionea* has been discussed on p. 136.

These insects occur on snow in winter; the larvæ live underground, apparently upon vegetable matters, and have been described in detail by Brauer (*Verh. Zool. Bot. Ver. in Wien.* 1854).

Chionea (from χιών, snow) *araneoides* has been described for the first time by Dalman, in 1816 (*K. Vetensk. Acad. Handl.* 1816, 102; Tab. II, fig. 2). A second European species, *Ch. crassipes*, has been described since by Boheman. Harris (*Ins. of Mass. Injur. to Veget.* 1841) first mentioned the American species, *Ch. valga*. Later, Mr. Walker described two North American *Chioneæ*, *Ch. aspera* and *scita*, the former of which is probably synonymous with *Ch. valga*. The descriptions of Mr. Walker's species are reproduced in the Appendix I to this volume.

I have never had an opportunity to observe any species of this genus alive, and possess only a single, somewhat mutilated specimen of one of the North American species. Partly from this specimen, partly from Dr. Harris's and Dr. Schiner's statements (*Fauna Austr.* l. c.) the foregoing generic description has been drawn. Assuming that my specimen is *Chionea valga* Harr., I describe it under this name.

Description of the species.

1. C. valga Harr. ♂.—Rufa, fuscescens, pedibus pallidioribus.

Brownish-red, feet paler. Long. corp. 0.22.

Syn. *Chionea valga* Harris, Ins. Injur. to Veget. etc. 1841.
Chionea aspera Walker, List, etc. I, p. 82.

Head brownish-red, in a reflected light the front and vertex show a hoary bloom; palpi brown; front with an impressed transverse line between the eyes; vertex broad, rounded, sparsely clothed with erect, blackish, rather long hairs; the brownish antennæ are but little longer than the head, from the point of its connection with the collare to the extremity of the labium (their description is given above). Thorax reddish-brown (injured by the pin in my specimen); halteres brownish-yellow. Abdomen short, pubescent with yellowish, segments contracted (at least in the dry specimen), so that the last joint, which is horny and subglobular, appears to be larger in size than the remainder of the

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abdomen; the color of the abdomen is pale brownish; last joint reddish-brown, with brownish hairs, especially on its rounded under side; its upper side convex, with an open space below (fornicate); forceps large, reddish; horny appendages stout, claw-shaped, ending in a rather blunt point. Feet paler than the body, reddish-yellow, rather uniformly beset with long, blackish hairs; the hairs on the under side of the first tarsal joint are shorter, but denser than those on the upper side; under side of the following joints with a microscopic pubescence; under side of the last joint not excised in the male; the length of the femora is equal to about three-quarters of the length of the body.

Hab. Massachusetts; Canada (Harris).

Gen. XX. SYMPLECTA.

Two submarginal cells; four posterior cells; discal cell closed; the second longitudinal vein originates before the middle of the length of the wing and at a considerable distance (about equal to the breadth of the wing) before the tip of the auxiliary vein; the subcostal cross-vein is at a considerable distance (three lengths of the great cross-vein or more) from the tip of the auxiliary vein; *the seventh longitudinal vein is strongly bisinuated* (Tab. I, fig. 20, wing of *S. punctipennis*). Wings and their veins glabrous. Antennæ 16-jointed. Tibiæ without spurs at the tip; ungues small, empodia distinct. The forceps of the male consists of two elongated subcylindrical basal pieces, with two blunt horny appendages attached to each of them (Tab. IV, fig. 21, forceps of *S. punctipennis*, from above). Ovipositor with curved, pointed upper valves and short lower ones.

The close relationship between this genus and *Trimicra* has already been pointed out under the head of the latter genus. However, the three terminal joints of the antennæ are not abruptly smaller, the wings are somewhat broader, the second vein, after originating from the first, describes a gentle curve (and therefore does not form an acute angle with the first); the seventh longitudinal vein is bisinuated, not straight; the basal pieces of the forceps are subcylindrical, elongated, and not so much incrassated as in *Trimicra*, leaving a large interval, distinctly perceptible even in dry specimens, between them and the horny appendages. The structure of the feet is the same, and the ungues are also inserted under a slight projection of the last tarsal joint.

Meigen adopted this genus in 1830 (*Meig. Zweifl.* etc. VI, p.

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282). Since then, it has been retained by all the subsequent authors. Its name (from σὺν, with, and πλέκω, to connect) alludes, I suppose, to the supernumerary cross-vein of *S. punctipennis*. A little earlier than Meigen, in 1825, St. Fargeau (*Encycl. Méthod. Ins.* Vol. X, p. 585) proposed to call this genus *Helobia*. Meigen's name, as that given by the monographer of the order and consecrated by a long usage, ought not to be superseded.

Three European species are known; one of them, which has a supernumerary cross-vein in the first submarginal cell, occurs also in America (*S. punctipennis*). In this species it is the posterior branch of the fourth longitudinal vein which is forked; in the two other species (*S. similis* and *stictica*) it is the anterior one; this is indicated in each case by the shape of the discal cell. Like *Trimicra*, the three species of *Symplecta* have the great cross-vein anterior to the inner end of the discal cell, and rather oblique. The supposed new genus and species *Idioneura macroptera* Philippi (*Verh. Zool. Bot. Gesellsch.* 1865, p. 615, Tab. XXIII, fig. 4), is undoubtedly *Symplecta*, and not at all unlikely the same *S. punctipennis* M.

Description of the species.

1. S. punctipennis O. S. ♂ and ♀.—Cinerea, thoracis vittis tribus fuscis; alis albicantibus, venis transversis obscure nebulosis; venulâ transversâ supernumeraria in cellulâ marginali secundâ.

Gray, thorax with three brown stripes, wings whitish, cross-veins clouded; a supernumerary cross-vein in the second marginal cell. Long. corp. 0.23—0.25.

Syn. *Limnobia punctipennis* Meig. Eur. Zw. Ins. I, p. 147; Tab. V, fig. 7.
Symplecta punctipennis Meig. l. c. VI, p. 283.
Symplecta punctipennis O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 228.
Symplecta cana Walk. List, etc. I, p. 48.

Head gray, antennæ and palpi black; thorax gray, hoary on the pleuræ; three distinct brown stripes above; the lateral ones cross the transverse suture; knob of the halteres infuscated; feet brown; abdomen gray, darker above; wings (Tab. I, fig. 20) with a whitish tinge; a supernumerary cross-vein about the middle of the first submarginal cell; the posterior branch of the fourth longitudinal vein is forked, and hence, the inner end of the third posterior cell is nearer the basis of the wing than the inner end

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of the second; the first is pointed, the latter square; the great cross-vein is some distance anterior to the discal cell; all the cross-veins, the origin of the præfurca, and the tip of the first longitudinal vein are clouded with brownish-gray.

Common everywhere in the spring and in autumn. I possess specimens from Washington, D. C.; Mobile, Ala.; New York; Canada; Illinois (Kennicott). The supernumerary cross-vein of the first submarginal cell is wanting in some specimens; the discal cell is sometimes open.

Gen. XXI. GNOPHOMYIA.

Two submarginal cells; four posterior cells; a discal cell; the second longitudinal vein originates somewhat before the middle of the anterior margin, a considerable distance anterior to the tip of the auxiliary vein; præfurca very slightly arcuated at the basis, nearly straight; subcostal cross-vein at a small or moderate distance (hardly exceeding the length of the great cross-vein) from the tip of the auxiliary vein; seventh longitudinal vein nearly straight. Wings glabrous (except an almost microscopic pubescence in the apical cells of *G. luctuosa*). Antennæ 16-jointed. Tibiæ without spurs at the tip; tarsi with distinct empodia. The forceps of the male (Tab. IV, fig. 19, forceps of *G. tristissima* when open) consists of two comparatively short basal pieces, and a pair of claw-shaped horny appendages; a second pair of horny appendages, below the first, is shorter and stouter.

Body and feet rather stout; the latter of moderate length, their pubescence short; femora slightly incrassated before the tip. Front broad, very convex; eyes glabrous, almost contiguous on the under side; rostrum short; palpi of moderate length; last joint somewhat elongated. Antennæ 16-jointed; when bent backwards they reach a little beyond the root of the wings in both sexes; joints of the flagellum elongated, subcylindrical in *G. tristissima;* short, subglobular in *G. luctuosa;* verticils much longer in the former than in the latter. Collare somewhat elongated in *G. tristissima;* short and stout in *G. luctuosa.* Suture of the thorax distinct. The wings are rather broad in *G. luctuosa;* narrower in *G. tristissima* (Tab. II, fig. 5, wing of *G. tristissima*). The marginal cross-vein is close by the inner end of the first submarginal cell; the great cross-vein is more or less posterior to the inner end of the discal cell; the latter elongated; the fifth, sixth, and seventh longitudinal veins are nearly straight (more details about the venation and the differences between that

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of the two North American species will be given below in the description of these species). The horny appendages of the forceps of *G. tristissima* are remarkably slender, almost linear and pointed; the corresponding appendages of *G. luctuosa* seem to be shorter. The ovipositor of the female (*G. tristissima*) has the upper valves of moderate length and breadth (Tab. IV, fig. 19, *a*); incrassated and arcuated *on the under side* at the basis, which gives a peculiar appearance to their manner of attachment; the lower valves are very short, reaching but little beyond the basis of the upper pair.

Closely allied as *Gnophomyia* is to *Trimicra* and *Symplecta*, it may at once be distinguished by the position of the subcostal cross-vein, which is much nearer to the tip of the auxiliary vein than is the case in those genera; by the position of the great cross-vein, which is not anterior to the inner end of the discal cell; by the structure of the forceps of the male, etc. Both North American species are altogether black; the knob of the halteres of one of them only is yellow. I have seen two South American *Gnophomyiæ* in the Berlin Museum, one of which is the *Limnobia nigrina* Wied. *Auss. Zw.* II, p. 37. A handsome species from the Cape, with brown wings, banded with white (in the same museum), is either a *Gnophomyia*, or closely related to this genus.

The genus *Gnophomyia* (from γνόφος, darkness, and μῦια, fly) was introduced by me in the *Proc. Acad. Nat. Sci. Philad.* 1859, p. 223. The genus described under this name in the *Fauna Austriaca* is *Trimicra* (comp. above, page 167).

A genus closely allied to the present one is *Psiloconopa* (from ψιλός, glabrous, and σκνίψ, gnat). It was established by Zetterstedt, in 1840 (*Fauna Lapponica*, p. 847, and later *Dipt. Scand.* X, p. 4007), upon a single species (*P. meigenii*), found in the northern parts of Sweden. The genus has hardly been noticed since, although several other species occur in Europe. The typical species, *P. meigenii*, I have not seen, but have before me an apparently undescribed species from Germany, larger than *P. meigenii*, and distinguished by the frequent absence of the marginal cross-vein. Of another, smaller species, I have a single specimen from the north of Italy. It has no marginal cross-vein and its discal cell is open, coalescing with the *third* posterior cell. There is but little doubt that this species is the *Erioptera*

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lateralis Macq. *Hist. Natur. Dipt.* II, p. 653 (syn. *Limnobia flavolimbata* Hal. in Walker's *Ins. Brit. Dipt.* III, p. 304). The two species which I have before me otherwise agree in their venation, and differ in it from *Gnophomyia:* the anterior branch of the second longitudinal vein is short and oblique, almost like that of *Goniomyia*, thus modifying the shape of the first submarginal cell (it seems, however, that in *P. meigenii*, which I have not seen, the first submarginal cell has the same shape as in *Gnophomyia*); the petiole of this cell is longer; the marginal cross-vein seems to be usually wanting. The abdomen of the German species is more club-shaped at the tip than that of *Gnophomyia*, and the forceps has a different structure. Again, the three European species agree among themselves in their coloring; they have yellow stripes on the sides of the thorax and a yellow scutellum, besides some other yellow marks peculiar to some of them. The known American species of *Gnophomyia* are altogether dark in their coloring, except the halteres of *G. tristissima*, which are yellow.

Psiloconopa supplies, in my opinion, the missing link between the *Eriopterina* and the genus *Goniomyia*, the link for which I have been looking unsuccessfully in the *Proc. Acad. Nat. Sci. Philad.* 1859, p. 230. This has become particularly evident to me, since I have seen *Psiloconopa lateralis* Macq., the venation of which (short first submarginal cell, oblique anterior branch of the second vein, open discal cell, coalescent with the *third* posterior cell) very forcibly reminds of *Goniomyia*. The prevalence of yellow in the coloring of *Psiloconopa* increases the probability of the relationship of these two genera. My knowledge of *Psiloconopa* is not sufficient to enable me to decide upon the degree of this relationship; but at the same time, I have seen enough of this genus to convince me that it would be premature to unite it with *Gnophomyia*.

Description of the species.

1. G. luctuosa O. S. ♂.—Atra, halteribus atris; alis obscure infumatis.

Black, opaque; halteres black; wings smoky blackish. Long. corp. 0.32.

Syn. *Gnophomyia luctuosa* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 224. *Limnobia nigricola* Walker, Trans. Ent. Soc. Lond. V, n. s. part VII, p. 66.

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The whole body, including the halteres, of a deep, opaque black; velvet black on the thorax. Wings smoky, nearly black; costal cell still darker; stigma hardly distinct; a short, almost microscopic pubescence in the apical portion of the wings; the venation is somewhat different from that of the following species; the anterior branch of the second longitudinal vein is almost imperceptibly arcuated; the posterior branch and the third vein are quite straight; the petiole of the first submarginal cell (that is, the distance between its inner end and the tip of the præfurca) is not much longer than the distance between the tip of the præfurca and the small cross-vein. The forceps of the male is hairy; the horny appendages seem to be somewhat stouter than in the following species; the joints of the flagellum, at least the four or five basal ones, are short, not much longer than broad, with a delicate, short pubescence on the under side.

Hab. Florida; I caught a single male, in March, 1858. That Mr. Walker's *L. nigricola* has been published later than 1859, appears from the circumstance that Mr. Bellardi's work, published in that year, is quoted by him in the same paper (page 2d).

2. G. tristissima O. S. ♂ and ♀.—Nigra, pedibus piceis; halteres capitulis flavis; alæ subhyalinæ, stigmate oblongo, obscuro.

Black, feet blackish-brown; knob of the halteres yellow; wings subhyaline, stigma oblong, dark. Long. corp. 0.25—0.35.

Syn. *Gnophomyia tristissima* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 224.

Body black, but little shining; mesonotum more gibbose than in *G. luctuosa;* a slight hoary reflection on the lower part of the pleuræ and sometimes on the front; feet dark brown, coxæ black; stem of the halteres brown, knob yellow; wings (Tab. II, fig. 5) slightly tinged with brownish-gray; stigma blackish, elongated, divided longitudinally in two halves by the first longitudinal vein; the marginal cross-vein, usually placed at the inner end of the first submarginal cell, is sometimes a little posterior to it; both branches of the second longitudinal vein and the third vein are arcuated; the petiole of the first submarginal cell is longer here than in *G. luctuosa;* whereas the small cross-vein is close by the origin of the third vein. The forceps (Tab. IV, fig. 19) and the ovipositor (fig. 19 *a*) have been described above.

Not rare; Washington, D. C.; New York; Virginia; Upper Wisconsin River (Kennicott).

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Gen. XXII. PSILOCONOPA.

This European genus being but imperfectly known by me, I have to confine myself to the remarks already given about it in the genus *Gnophomyia* (compare p. 173).

Gen. XXIII. GONIOMYIA.

Two submarginal cells; *the first very short, subtriangular*, owing to the shortness and the oblique direction of the anterior branch of the second longitudinal vein (Tab. II, fig. 4, wing of *G. subcinerea*; fig. 2, *G. sulphurella*); no marginal cross-vein; four posterior cells; discal cell open or closed; when open, it is coalescent with the *third* posterior cell; wings glabrous. Antennæ 16-jointed, rather short. Feet long, slender; tibiæ without spurs at the tip, tarsi with distinct empodia. Forceps of the male with several branches and linear appendages (Tab. IV, fig. 17, forceps of *G. blanda*; fig. 18, of *G. cognatella*). Ovipositor of the female slender, arcuated.

Rostrum and palpi short; the joints of the latter nearly of equal length. The antennæ, if bent backwards, would not reach beyond the root of the wings; the joints of the flagellum are short subcylindrical or oval, verticillate; in *G. sulphurella* the basal joints in the male are strongly incrassated. The feet are more or less pubescent; sometimes this pubescence is hardly perceptible. The wings vary in length; they are comparatively short in *G. sulphurella* (Tab. II, fig. 2), and longer in *G. subcinerea* (Tab. II, fig. 4) and *blanda*. The venation has many striking peculiarities; the tip of the auxiliary vein is nearly opposite the origin of the second longitudinal vein, often a little before or a little beyond it; never so much beyond it as in the other *Eriopterina*; the subcostal cross-vein is at this very tip (*G. subcinerea, cognatella, sulphurella*), or quite near it (*G. blanda*). The præfurca originates about the middle of the anterior margin; it is more or less arcuated; the first submarginal cell is very short; its petiole being long and its inner end being posterior to the tip of the first longitudinal vein, or at the utmost, nearly opposite this tip (*G. blanda*); the anterior branch of the second longitudinal vein is short, running obliquely towards the costa and reaching it at a short distance beyond the tip of the first longitudinal vein, or at this very tip (*G. blanda*); this course of the anterior branch of the second longitudinal vein gives to the first submarginal cell a triangular shape; the marginal cross-vein is

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wanting in all the species to me known; the relative length of the second submarginal and of the first posterior cells is somewhat variable; they are of equal length in *G. sulphurella;* the submarginal is a trifle longer in *G. cognatella* and *subcinerea;* a good deal longer in *G. blanda;* the discal cell is open in some species and closed in others; this character is in some measure even variable within the same species, and therefore not entirely reliable; whenever the discal cell is open, it coalesces with the *third* posterior cell,[1] and thus it becomes apparent that it is the *anterior* branch of the fourth longitudinal vein which is forked; fifth, sixth, and seventh veins nearly straight; the latter sometimes slightly curved before the tip. The veins almost glabrous, except in some rare cases, when they show a more distinct, although very short pubescence.

These delicate insects are distinguished by the frequent occurrence of a peculiar sulphur yellow in their coloring, and in this respect the European and the American species agree with each other. They are not numerous—four or five being known in Europe, and four having been discovered in America. The peculiar shape of the first submarginal cell distinguishes them easily; and if we add to that the relative position of the tip of the auxiliary vein to the origin of the second vein (so different from the other *Eriopterina*), the absence of the marginal cross-vein (at least in all the species known to me); the coalescence of the discal cell with the *third* posterior cell, whenever it is open; and the peculiar structure of the male forceps, visible even in dry specimens, we will have sufficiently characterized the genus. The majority of the European species have the forceps of an analogous structure; one or two of them seem to be different; I have not seen the species of the latter kind and have therefore no opinion about them.

In speaking of the genus *Psiloconopa* (compare above, p. 174) I have alluded to the possible relationship between it and *Goniomyia*, especially apparent in the European *P. lateralis* Macq.; this discovery seems to resolve the doubts which I formerly entertained (*Proc. Acad. Nat. Sci. Philad.* 1859, p. 230) about the location of *Goniomyia* among the *Eriopterina*.

[1] Exceptions are merely individual; thus I have seen a specimen of *G. subcinerea*, the discal cell of which was coalescent with the second posterior cell.

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By all means the position of *Goniomyia*, as proved by its characters, is on the extreme limit of the group of *Eriopterina*, and this view is strengthened by the following circumstance: The smallness of the first submarginal cell seems to foreshadow its entire disappearance; and indeed, I possess two specimens where this disappearance actually takes place through the obliteration of the branch of the second longitudinal vein. One of these specimens resembles *G. sulphurella* very much; it is barely possible that it is an accidental abnormity[1] of a specimen of this

[1] While this volume was in press, I have found a second specimen of the same kind, and have had the opportunity to examine it when it was still alive. It is not an accidental abnormity, but a new species closely allied to *G. sulphurella*. Although a new genus might be easily formed upon this species, I prefer to leave it in the genus *Goniomyia*, until more species of the same kind are made known. Thus *Goniomyia* will contain species with *two* and with *one* submarginal cell, just as *Limnophila* contains species with *five* and with *four* posterior cells.

Goniomyia manca, n. sp. ♀.—Flava, sulphureo maculata, halteribus sulphureo-flavis; alæ cellulâ submarginali unicâ.

Yellow, marked with sulphur yellow, halteres sulphur yellow; wings with a single submarginal cell. Long. corp. 0.2.

Rostrum yellowish, palpi brown; front brownish in the middle; two basal joints of the antennæ yellowish, considerably infuscated; the first is small; the second much larger than the first, rounded; flagellum blackish, slender, with long verticils (somewhat similar to those of *G. sulphurella*), which give the flagellum a feather-like appearance. Thorax yellow, pale brownish above with faintly indicated stripes and a slight gray bloom; collare and upper part of the pleuræ sulphur yellow; the remainder of the pleuræ with a hoary bloom; halteres with a sulphur yellow knob. Abdomen and male forceps yellow. Feet yellowish-tawny; the tips of the femora, tibiæ, and tarsi hardly darker. Wings immaculate, with a slight grayish tinge; the venation is precisely like that of *G. sulphurella* (Tab. II, fig. 2), except that the *posterior* branch of the second longitudinal vein is obliterated; thus the second longitudinal vein, shortly before its tip, takes a sudden turn towards the anterior margin, in consequence of which the submarginal cell is trumpet-shaped, that is, very considerably narrower at its inner than at its outer end. The discal cell is closed.

The forceps of the male (which I have examined on a living specimen) belongs to the same type of structure as those of the other species of *Goniomyia*, but the structure is more simple than that of the two species the forceps of which I have figured (Tab. IV, fig. 17 and 18). There are two lateral, elongated, subcylindrical (digitiform) lobes, converging, but

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species; the specimen is too imperfectly preserved to allow a close comparison. The other specimen, however, belongs to a species which is manifestly distinct from all known *Goniomyiæ*, but which, at the same time, shows the characters of this genus in a most striking manner; the venation (except the absence of the first submarginal cell) resembles that of *G. sulphurella*, but the auxiliary vein is much shorter; the marginal cross-vein is absent; the discal cell is open and coalesces with the third posterior cell; the costa has a remarkable whitish tinge; otherwise the coloring and the general appearance of the insect are those of *Goniomyia*. The structure of the male forceps would be decisive as to the relationship of this species; but the specimen is a female.

The name of this genus occurs for the first time in Meigen, Vol. I, p. 146, as Gonomyia. Megerle sent him *L. tenella* under that generic denomination, which, however, Meigen did not adopt. It was revived afterwards by Mr. Stephens in his *Catalogue*, etc. (1822), and by Mr. Curtis in his *Guide* (1837), in connection with the same species, but without any definition. I have defined the genus in the *Proc. Acad. Nat. Sci. Philad.* 1859, p. 229, and described the four North American species belonging to it. In 1864 Dr. Schiner (*Fauna Austriaca, Dipt.* Vol. II, p. 543) gave this genus a wider definition by admitting in it some species which, according to my opinion, it is better to separate, and which now form the genus *Empeda*.

As the name of this genus is probably derived from γωνία, angle, in allusion to the shape of the fork of the second longitudinal vein, I propose to amend it in *Goniomyia*.

Table for the determination of the species.

1	Wings spotted.	4 **blanda** *O. S.*
	Wings not spotted.	2

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not lapping over each other in repose; immediately above and parallel to them is a single, long, horny style, the tip of which reaches beyond the tip of the lobes; below the lobes, some small, black, horny organs are perceptible.

Hab. South Orange, N. J., June 30, 1868; a single specimen.

The first longitudinal vein in my specimen comes to an abrupt termination before reaching the costa.

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2	Femora with a distinct brown band before the tip; knob of the halteres lemon yellow.	1 **sulphurella** *O. S.*
	Femora without brown band.	3
3	Antennæ orange at the basis.	2 **cognatella** *O. S.*
	Antennæ entirely black.	3 **subcinerea** *O. S.*

Description of the species.

1. G. sulphurella O. S. ♂ and ♀.—Sulphureo-flava, fusco-variegata; antennis basi aurantiacis, in mare verticillis longis; femoribus annulo fusco; cellulâ discoidali (in speciminibus typicis) clausâ.

Sulphur yellow, variegated with brown; antennæ orange yellow at the basis; those of the male with long verticils; femora with a brown band; discal cell (in normal specimens) closed. Long. corp. 0.2—0.25.

Syn. *Gonomyia sulphurella* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 230.

Front and vertex sulphur yellow, infuscated in the middle; proboscis, palpi, and antennæ brown; basal joints of the latter orange yellow; flagellum of the male incrassated at the base and slender beyond it, with long, feathery verticils; that of the female filiform with short verticils; collare sulphur yellow; mesonotum light brown, yellow along the margins; scutellum yellow with a brown line in the middle; metathorax yellowish, infuscated in the middle; pleuræ yellow above; a yellow stripe, margined with brown, runs from the fore coxæ backwards; halteres yellow; knob lemon yellow; coxæ pale yellow; femora slightly incrassated at the tip, with a yellow band beyond the middle and a brown band near the tip, which is yellow; anterior pair of femora darker, their tip brown; tibiæ tawny, infuscated at the tip; tarsi fuscous. Abdomen of the male lemon yellow; base of the segments brown, genitals yellow; abdomen of the female brownish; posterior margins of the segments yellow, genitals ferruginous. Wings (Tab. II, fig. 2) slightly gray, pale at the base, stigma pale; origin of the præfurca a little posterior to the tip of the auxiliary vein, strongly arcuated; the remainder of the course of the second vein is parallel to the first; the distance between the tips of the two branches of the second longitudinal vein is nearly equal to the distance between the tip of the anterior branch and that of the first longitudinal vein; the inner ends of the second submarginal, first posterior, discal, and fourth posterior cells are nearly on one line; the third vein is arcuated,

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strongly converging towards the anterior branch of the fourth vein; discal cell closed in the majority of the specimens.

Common, in summer; Washington, D. C.; Trenton Falls, N. Y., etc. Among fifteen specimens which I had before me, when I first described this species, only one had the discal cell open.

2. G. cognatella O. S. ♂ and ♀.—Sulphureo-flava, fusco variegata, antennis basi aurantiacis, in mare dense pubescentibus, verticillis brevibus; pedibus unicoloribus; cellulâ discoidali apertâ.

Sulphur yellow, variegated with brown; antennæ orange yellow at the basis, densely pubescent and with short verticils in the male; feet unicolorous; discal cell open. Long. corp. 0.2—0.25.

Syn. *Gonomyia cognatella* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p 230.

Very like the preceding, but easily distinguished by the following characters: The antennæ of the male are covered on every joint with a short, dense pubescence, which, being interrupted at the articulations, makes the antennæ appear moniliform; the halteres (both stem and knob) are infuscated; the pleuræ are yellow, with a brown stripe; the feet are uniformly pale tawny, only the tips of the tarsi darker; the discal cell is open (at least in the normal specimens); the inner angle of the marginal cell is more acute, the præfurca running obliquely from the first longitudinal vein; the anterior branch of the second longitudinal vein is more oblique, and therefore somewhat longer; the distance between the tips of both branches of this vein is about twice the length of the distance between the tip of the anterior branch and that of the first longitudinal vein; the third vein is straight, although, in its whole course, somewhat converging towards the anterior branch of the fourth; the second submarginal cell is somewhat longer than the first posterior. The forceps of the male (Tab. IV, fig. 18) has a somewhat different structure from that of *G. sulphurella*.

Hab. Washington, D. C. I had seven specimens.

3. G. subcinerea O. S. ♂ and ♀.—Sulphureo-flava: mesonoto cinereo-fusco; antennis nigris; pedibus unicoloribus; cellulâ discoidali (in speciminibus typicis) clausâ.

Sulphur yellow; mesonotum grayish-brown; antennæ black; feet unicolorous; discal cell (in the normal specimen) closed.

Syn. *Gonomyia subcinerea* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 231.

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Rostrum yellow, palpi brown; antennæ black; those of the male have moderately long verticils; thorax sulphur yellow; mesonotum grayish-brown; pleuræ without any brown stripes, uniformly yellow; halteres very slightly infuscated; feet pale tawny. Wings (Tab. II, fig. 4) comparatively longer than in the preceding species; the discal cell is closed in normal specimens; the tip of the auxiliary vein is a little posterior to the origin of the præfurca; the interval between the tip of the first longitudinal vein and the anterior branch of the second vein is five or six times shorter than the interval between the tips of the two branches of the second vein; the inner end of the second submarginal cell is pointed, very little anterior to the inner end of the first posterior cell; the third vein is straight and very little convergent with the anterior branch of the fourth; the inner end of the marginal cell (angle of the præfurca) almost acute; the inner ends of the first and fourth posterior, and of the discal cell, nearly in one line. Abdomen brown above; margins of the segments yellow; venter and forceps of the male yellow; the latter with linear, hairy, slightly dusky appendages.

Hab. Trenton Falls, N. Y.; Washington, D. C. Among twelve specimens, the discal cell is open in one only.

4. G. blanda O. S. ♂ and ♀.—**Alæ stigmate et marginis anterioris parte apicali fuscis; venulis transversis infuscatis; venæ longitudinalis secundæ rami anterioris apex cum apice venæ longitudinalis primæ coincidens.**

Wings with the stigma and the apical portion of the anterior margin infuscated; cross-veins clouded; the tip of the anterior branch of the second vein is coincident with the tip of the first longitudinal vein. Long. corp. 0.25—0.28.

Syn. *Gonomyia blanda* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 231.

Rostrum gray, margined with yellow above; front and vertex gray, margined with yellow along the eyes; antennæ brown; two basal joints yellow. Thorax gray above, with two approximated brownish stripes in the middle; two hardly distinct lateral stripes; scutellum brownish, gray in the middle; metathorax brownish; pleuræ pale yellow, slightly hoary; halteres dusky, with dark knobs; feet pale yellow, pubescent; tips of the femora, of the tibiæ, and the whole of the tarsi dark brown; abdomen grayish-brown; lateral and posterior margins of the segments yellow;

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venter yellow; male forceps yellow, with black horny appendages (Tab. IV, fig. 17). Wings with the cross-veins and the inner ends of the basal cells, and of the second submarginal and second posterior cells clouded; the stigma and the portion of the anterior margin between it and the tip are blackish; the præfurca, strongly arcuated at the basis, is parallel, during the remainder of its course, to the first longitudinal vein; the tip of the anterior branch of the second longitudinal vein is coincident with the tip of the first longitudinal vein; the origin of the præfurca is a little anterior to the tip of the auxiliary vein; the second submarginal cell is longer than the first posterior; generally there is a stump of a vein near the origin of the præfurca, and an indication of a second stump at the inner end of the second posterior cell; discal cell open; the great cross-vein is a considerable distance before the inner end of the discal cell.

Hab. Washington, D. C.; Trenton Falls, N. Y.; South Carolina (Berlin Museum).

Gen. XXIV. EMPEDA.

Two submarginal cells; the first rather short, owing to the shortness and the oblique direction of the anterior branch of the second longitudinal vein; a distinct marginal cross-vein connecting the first and second longitudinal veins is inserted a considerable distance before the inner end of the first submarginal cell; four posterior cells; discal cell closed or open; when open, it coalesces with the *second* posterior cell. Wings glabrous. Antennæ 16(?)-jointed. Tibiæ without spurs at the tip, tarsi with distinct empodia.

This genus is undoubtedly allied to *Goniomyia*, as the general appearance, the coloring, and in part also the venation of the species show. Dr. Schiner (*Fauna Austriaca, Diptera*, II, p. 542) gave a wider definition to *Goniomyia*, so as to embrace this group of species also. I think, however, that it is sufficiently distinct, to be introduced as a separate genus, leaving *Goniomyia* with its former definition (as adopted by me in 1859). *Empeda* differs from *Goniomyia* in the following characters: 1. The marginal cross-vein is present; but owing to the shortness of the anterior branch of the second longitudinal vein, it is not this branch, but the petiole of the first submarginal cell, which the cross-vein connects with the first vein; the cross-vein is thus placed between the origin of the third longitudinal vein and the fork of the

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second, and nearer to the former than to the latter. (Compare the figures of the wings of the European species *nubila* and *flava* in *Schummel's Beiträge*, etc. Tab. II, fig. 4 and 5, which, in regard to the position of the cross-vein, are in perfect agreement with the American species.) 2. The auxiliary vein is longer than in *Goniomyia*, that is, it extends beyond the origin of the second longitudinal vein to a distance which is equal to half the breadth of the wing, or a little shorter; the cross-vein is very near its tip (this, according to the same figures of Schummel, is also the case with the European species). 3. Whenever the discal cell is open, it coalesces with the *second*, not with the *third* posterior cell (the latter is the case in *Goniomyia*); in other words, it is not the *anterior* branch of the fourth longitudinal vein, but the *posterior* one, which is forked (this again is distinctly mentioned by Schiner, l. c. p. 544, lines 4 and 14 from the bottom, for the European species, and figured by Schummel). 4. The forceps of the male has a different structure; I am unable to describe it, not having observed it on any living specimen, but even dry ones show plainly that the forceps has a more simple structure, and none of the numerous branches which distinguish the forceps of *Goniomyia*.

Besides the single North American species, described below, three European species undoubtedly belong here: *Limnobia diluta* Zett. (Schiner); *Limn. flava* Schum.; *Limn. nubila* Schum.

The name of this new genus is derived from ἴμπεδος, steady, unshaken.

Description of the species.

1. E. stigmatica, n. sp. ♂.—Fuscana, halteribus pallidis, alis immaculatis; cellula discoidalis aperta, cum secunda posteriori confluens.

Brownish, with pale halteres, immaculate wings, and an open discal cell coalescent with the second posterior cell. Long. corp. 0.2.

Dull brownish; antennæ black; in the male, with rather long verticils; a sulphur yellow spot on the humeri; halteres pale yellow; forceps of the male reddish-brown; feet tawny. Wings nearly hyaline; veins brown; stigma very slightly tinged with brown; the tip of the auxiliary vein is nearly in the middle of the distance between the origin of the præfurca and the marginal cross-vein; the distance between the tip of the first longitudinal

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vein and the tip of the anterior branch of the second is distinctly shorter than the distance between the tips of both branches of the second vein; third and fourth veins somewhat converging; discal cell open, confluent with the second posterior cell (for more details about the venation compare the generic characters).

Hab. Trenton Falls, N. Y. A male specimen; another one, which is injured, has only the thorax and the wings left.

Gen. XXV. CRYPTOLABIS.

Two submarginal cells; *the inner marginal cell is short and almost triangular* (Tab. II, fig. 11), owing to the shortness and the very oblique course of the præfurca; the origin of the latter is a little beyond the middle of the length of the wing; four posterior cells; *discal cell open;* the posterior branch of the fourth longitudinal vein is forked. Wings glabrous, except an almost microscopic pubescence in the apical portion of the wing. Antennæ 16-jointed. Tibiæ without spurs at the tip; empodia distinct. Forceps of the male with very small horny appendages; *ovipositor of the female without any apparent horny valves.*

The body is short and stout; the antennæ, if extended backwards, would not quite reach the root of the wing; joints of the flagellum oval, with rather long, verticillate hairs. Rostrum short; palpi with subcylindrical joints of nearly equal length. Feet rather short and stout, strongly pubescent; those of the intermediate pair much shorter than the hind ones; tibiæ slightly incrassated towards the tip; ungues very small; empodia distinct. Thoracic suture distinct. Wings (Tab. II, fig. 11) comparatively short and broad; the auxiliary vein ends a little beyond the origin of the second longitudinal vein; the rather indistinct subcostal cross-vein is at a distance from the tip of the auxiliary vein, which is equal to about one and a half the length of the great cross-vein; owing to the shortness of the præfurca, the subcostal cross-vein is a little anterior to the origin of the latter; the branches of the second vein and the third vein are straight, the two latter nearly parallel; the veins separating the first, second, and third posterior cells are gently arcuated; the second submarginal cell is equal in length to the first posterior cell; the discal cell being open, coalesces with the second posterior cell. The inner marginal cell (included between the præfurca and the marginal cross-vein) is not elongated, as usual, but has the shape of an almost equilateral

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triangle; this is due to the shortness and the oblique course of the præfurca, the origin of which is a little beyond the middle of the length of the wing; the tip of the præfurca almost coincides with the origin of the third longitudinal vein. The portion of the fifth vein beyond the great cross-vein is at an obtuse angle with the previous course of this vein; the sixth longitudinal vein is gently arcuated; the seventh nearly straight. The forceps of the male (Tab. III, fig. 13 from above, fig. 13 *a* from below) has two small horny appendages which, in the state of repose, are closely applied to the under side of the fleshy basal pieces; hence, and owing to their smallness, they are indistinct. The ovipositor of the female is soft, obtuse, without any apparent horny lamels (Tab. III, fig. 13 *b*, side view; 13 *c*, from above). This structure of the ovipositor renders the recognition of the sexes very difficult in dried specimens.

The genus *Cryptolabis* (from κρυπτὸς, concealed, and λαβίς, forceps) has been introduced by me in 1859 (*Proc. Acad. Nat. Sci. Philad.* p. 224), for a single species which I discovered in Virginia. No other species has been added to it since.

1. C. paradoxa O. S. ♂ and ♀.—Thorace livido, nigro-vittato; antennis nigris; pedibus basi pallidis; alis immaculatis.

Thorax livid, with black stripes; antennæ black; feet pale at the basis; wings immaculate. Long. corp. 0.1—0.13.

Syn. *Cryptolabis paradoxa* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 225.

Head blackish; palpi and antennæ black. The color of the thorax is livid, but it is scarcely apparent between the black stripes; the intermediate stripe is double; the lateral ones are extended backwards beyond the suture; scutellum pale; metathorax dark; pleuræ blackish; halteres pale; feet hairy; coxæ and base of the femora pale; the tips of the latter brown; tibiæ brownish tawny, infuscated at the tip; the tarsi likewise. Abdomen blackish (often greenish in living specimens). Wings hyaline, without any apparent stigma; veins brown, costal and auxiliary veins pale yellow; the apical portion of the wings is slightly pubescent along the middle of the cells.

Hab. White Sulphur Springs, Va. Twenty-one specimens taken on the 30th of June, 1859.

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Gen. XXVI. CLADURA.

Two submarginal cells (compare above, p. 34, the wing of *C. indivisa*); *five posterior cells*, the second petiolate; discal cell closed; præfurca arcuated at its origin, which is very little anterior to the middle of the length of the wing, but a considerable distance anterior to the tip of the auxiliary vein (this distance being more than the breadth of the wing); subcostal cross-vein a short distance from the tip of the auxiliary vein; seventh longitudinal vein straight. Wings glabrous, except a short pubescence along the veins in the apical portion of the wing. Antennæ 16-jointed. Feet very long, pubescent: tibiæ without spurs at the tip; tarsi with distinct empodia; ungues smooth on the under side. The upper side of the last abdominal segment is horny, convex, having a rounded excision between two projecting points on its posterior margin (Tab. IV, fig. 22, forceps of *C. flavoferruginea*; *a*, horny convexity; *b*, excision); the forceps, inserted under the convexity, is large, and consists of a long, cylindrical basal joint and a horny branch upon it. Ovipositor with flattened, rather broad valves.

Rostrum and palpi short; last joint of the latter stout; front moderately broad, very convex above the eyes; the latter glabrous, almost contiguous on the under side of the head. The antennæ, if bent backwards, would reach the root of the wings; joints of the flagellum subcylindrical, slightly incrassated at the base; verticils of moderate length. The wings are rather long and comparatively narrow; the veins, on their apical portion, show a short, but distinct pubescence. The tip of the auxiliary vein is somewhat beyond the inner end of the first submarginal cell; the latter is shorter than the second submarginal; its petiole is about equal in length to the interval between the subcostal and marginal cross-veins; the marginal cross-vein is in the middle of the distance between the subcostal cross-vein and the tip of the first longitudinal vein; the præfurca is strongly arcuated; the second submarginal and first posterior cells are of nearly equal length; in *C. flavoferruginea* the second submarginal cell is divided in two parts by a cross-vein in its middle; this is not the case with the other species, *C. indivisa;* there are five posterior cells, the petiole of the second posterior cell is much shorter than this cell; the pentagonal shape of the discal cell plainly shows that it is the forking of the *posterior* branch of the fourth vein which forms one of its sides; the great cross-vein is posterior to the inner end of the discal cell; the fifth, sixth, and seventh longitudinal veins are almost straight. The presence of five

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posterior cells, and the unusual size and structure of the male forceps, render the recognition of this genus very easy.

The position of the subcostal cross-vein near the tip of the auxiliary vein; the shape of the inner end of the marginal cell, which is broad and not pointed, and before all the presence of five posterior cells—these characters show that there is a wide interval between this genus and the typical *Eriopterina*. *Cladura* is placed in this section on account of the absence of the spurs at the tip of the tibiæ; its general appearance is that of *Limnophila*, and the only character which may be indicative of a relationship to the *Eriopterina* is the pubescence of the wing-veins, which is more distinct here than is usual among the *Limnophilina*.

Cladura (from κλάδος, branch, and ὀυρὴ, tail, in allusion to the forceps of the male) was introduced by me in the *Proc. Acad. Nat. Sci. Philad.* 1859, p. 229. It has not been discovered in Europe, and besides the two North American species described below I know of no others.

Description of the species.

1. C. flavoferruginea O.S. ♂ and ♀.—Flavo-ferruginea; pleuræ punctis, abdomen fasciis brunneis; in cellulâ submarginali secundâ venula transversalis supernumeraria; venulæ transversæ omnes infuscatæ.

Ferruginous-yellow; pleuræ spotted, abdomen banded with brown; the second submarginal cell has a supernumerary cross-vein in the middle; all the cross-veins infuscated. Long. corp. 0.3—0.35.

Syn. *Cladura flavoferruginea* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 229.

Rostrum, palpi, and antennæ pale ferruginous; the two latter infuscated at the tip; mesonotum ferruginous, shining; a more or less apparent dark line in the middle; a brown spot on the humeri; pleuræ pale yellow; two brown spots between the humerus and the basis of the wing; a third one lower, about the middle of the pleuræ; scutellum and metathorax ferruginous; a small black dot on each side, between the latter and the basis of the halteres; these are pale; feet hairy, yellowish ferruginous; tips of the femora, of the tibiæ, and of the tarsi brown. Abdomen ferruginous; lateral margins of the segments brown, united by a pale brown band running across the middle of each segment; venter yellow; genitals ferruginous, shining. Wings yellowish; costa, first, and fifth longitudinal veins ferruginous; the other

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veins brown; cross-veins and origin of the præfurca clouded with brown; stigma pale; a supernumerary cross-vein about the middle of the second submarginal cell.

Hab. Washington, D. C.; October, November. Compared seven specimens; one of them has another supernumerary cross-vein in the first submarginal cell; it is a little anterior to the cross-vein of the second submarginal cell, and occurs on both wings of the specimen.

2. C. indivisa O. S. ♂ and ♀.—Flava; pleuræ punctis, abdomen fasciis brunneis; cellulâ submarginali secunda integrâ.

Yellow; pleuræ spotted, abdomen banded with brown; the second submarginal cell is not divided by a supernumerary cross-vein. Long. corp. 0.28—0.3.

Syn. *Cladura indivisa* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1861, p. 291.

Somewhat smaller than the preceding, and paler in coloring; origin of the præfurca and cross-veins but indistinctly clouded; no supernumerary cross-vein in the second submarginal cell (compare the wing of this species, on page 34); otherwise, the coloring is like that of the preceding species.

Numerous specimens, caught at Trenton Falls, N. Y., in September, 1860; some of the specimens, probably recently excluded, were pale, and without spots. Massachusetts (Scudder).

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SECTION IV. LIMNOPHILINA.

Two submarginal cells; usually five, seldom four posterior cells; discal cell generally present; subcostal cross-vein posterior to the origin of the second longitudinal vein, usually closely approximated to the tip of the auxiliary vein (considerably distant from it in *Trichocera* only). Eyes glabrous (pubescent in *Trichocera*). Normal number of antennal joints sixteen.[1] Tibiæ with spurs at the tip; empodia distinct; ungues smooth.

The contrast between the characters of the two sections of *Limnophilina* and *Limnobina*, has been explained under the head of the latter. This contrast shows itself, moreover, in another manner: While "the forms of *Limnobina*, belonging to the temperate regions of Europe and America, afford but little structural diversity, and their relationship is so great and evident that one is more tempted to unite them all in one genus, than to subdivide them in several" (compare above, p. 51), precisely the contrary is the case with the species of *Limnophilina*. The structural modifications they show are so numerous, that the desire to introduce new generic groups is restrained by the fear of adopting too many. At present, the section *Limnophilina* consists, properly speaking, of the single genus *Limnophila; Trichocera* is an aberrant form, singular in its structure as in its mode of life. *Epiphragma* and *Ulomorpha* are *Limnophilæ*, but sufficiently well-defined forms to be separated immediately, as several other forms will have to be separated, when better known (compare the genus *Limnophila* below).

The difference between the *Limnophilina* and *Eriopterina*, besides the presence of spurs at the tip of the tibiæ, consists in the following characters: The subcostal cross-vein in the majority

[1] This refers to the European and North American species; *Gynoplistia* Westw. has (♂) 18-, and (♀) 17-jointed antennæ; *Ctedonia* Phil. has 15–24 joints, etc.

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of the *Eriopterina* is far anterior to the tip of the auxiliary vein, in the *Limnophilina* it is usually at its tip; the *Eriopterina*, with the exception of *Cladura*, have four posterior cells, the majority of the *Limnophilina* five; in the *Eriopterina* the discal cell is very often open; very rarely among the *Limnophilina*. *Cladura* (*Eriopterina*), with its five posterior cells, is very like the *Limnophilina;* on the other hand, the *Limnophilina* with four posterior cells are very like some *Eriopterina*, as for instance *Gnophomyia;* besides the presence or absence of spurs, no important structural difference has been discovered yet, in order to justify the present location of these forms on more than artificial grounds; nevertheless, such differences in all probability exist (compare also p. 136).

The difference between the *Limnophilina* and the *Amalopina* consists in the position of the subcostal cross-vein, and in the pubescence of the eyes of the latter. In both characters, *Trichocera* shows an approach to the *Amalopina*. Another important difference is to be found in the structure of the penultimate posterior cell. In the *Amalopina* this cell (compare the Tab. II, fig. 14–18) is evidently formed by the fork of the *posterior* branch of the fourth vein. In the *Limnophilina* this cell looks in most cases as if its presence was merely due to a cross-vein, separating it from the discal cell; and indeed in the few abnormal specimens that came under my observation, in which the discal cell was open, it coalesced with the penultimate posterior cell, and not with the cell preceding it, as it always does in the *Amalopina;* in such specimens, the anterior branch of the fourth vein had a double fork, like *Dolichopeza* (compare Meigen, Vol. VI, Tab. 65, fig. 10, or Walker, *Ins. Brit. Dipt.* Tab. XXVIII, fig. 3 *b*). I have not met with any *Limnophilina* yet, which have the discal cell normally open (except the abortive form *Rhicnoptila;* compare p. 198). This peculiarity in the structure of the discal cell and of the penultimate posterior cell in *Limnophila* deserves to be noticed, although it has been too little observed yet to allow any general conclusions (compare the Introduction, p. 33).

The genera *Amalopis* and *Pedicia* have, in the majority of cases, the first submarginal cell longer than the second, in consequence of a peculiar structure of the fork of the second vein (as in Tab. II, fig. 14); such is never the case among the *Limnophilina*.

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The *Limnophilina* are further distinguished by the position of the great cross-vein, which is generally farther beyond the inner end of the discal cell than is usually the case among the *Tip. brevipalpi.* In *Trichocera* this cross-vein is at the very end of the discal cell. Exceptions occur, however (compare the genus *Limnophila* at the end).

Several remarkable foreign forms of *Limnophilina* have been described, but as I have not had the opportunity to study them I will merely enumerate them here. (The descriptions of these genera, with the necessary remarks and quotations, are reproduced or translated in the Appendix II.)

Gynoplistia Westw. is a *Limnophila* with unipectinate antennæ in both sexes; several species have been described from Australia and South America. Mr. Westwood has even described one, *G. annulata*, from North America. The description is reproduced in the Appendix I.

Ctedonia Philippi, from Chile, seems in no way distinct from a South American *Gynoplistia; Cloniophora* Schiner, from Australia, is established upon *Gynoplistia subfasciata* Walker, a species which shows some structural peculiarities.

Cerozodia Westw. from Australia, seems also to belong to the *Limnophilina;* it has 32-jointed, pectinate antennæ.

Polymoria Philippi, with five species from Chile, may be one of the numerous forms of *Limnophila*, although the statements of the author are not complete enough to admit of any conclusion.

Lachnocera Philippi, from Chile, is either a *Limnophila* with four posterior cells, or perhaps a genus related to *Goniomyia* (Eriopterina). The densely pubescent antennæ of this genus remind of the antennæ of *Limnophila lenta* O. S., which has also four posterior cells and a venation not quite unlike *Lachnocera.*

The *Limnophilina* contained in the Prussian amber are quite numerous. Mr. Loew's pamphlet, *Bernstein und Bernsteinfauna*, 1850, merely gives the names of the genera and species, without descriptions, but owing to the author's kindness, I have had a glimpse at the specimens, which convinced me of the close analogy of some of them to North American forms. *Cylindrotoma longicornis* Lw. is a *Limnophila*, closely allied to *L. macrocera* Say, by its long, pubescent antennæ, its somewhat elongated last joint of the palpi, and its venation. *Cylindrot. brevicornis* Lw. is a *Limnophila* of the type of *L. tenuipes* Say; *Cylindr. succini*

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and *longipes* Lw. are likewise *Limnophilæ*. The genus *Tanymera* Lw. contains *T. gracilicornis*, which belongs to the relationship of the North American *Limnophila recondita* O. S. *Tanysphyra* Lw. and *Critoneura* Lw. seem likewise to be *Limnophilæ*. The amber genus *Trichoneura* Lw. is distinguished by the first longitudinal vein being incurved towards the second, and ending in it, almost as in the *Cylindrotomina*. I take it to be a *Limnophila* with four posterior cells; what appears to be the end of the first vein, is in reality the marginal cross-vein, whereas the real end of this vein, touching the costa, is visible, but feebly marked; this structure reminds of a similar one, often occurring among the *Limnobina* (compare Tab. I, fig. 2, the wing of *Dicranomyia pubipennis*), but not observed among the *Limnophilina*. The shortness of the auxiliary vein in *Trichoneura*, the course of the central cross-veins, the position of the great cross-vein, etc., remind of the wing of *Limnophila quadrata* (Tab. II, fig. 9), and convince me that *Trichoneura* is related to it.

Gen. XXVII. EPIPHRAGMA.

Two submarginal cells; five posterior cells; discal cell closed; subcostal cross-vein at the tip of the auxiliary vein; *a supernumerary cross-vein between the costa and the auxiliary vein.* Wings glabrous, handsomely pictured. Eyes glabrous. Antennæ 16-jointed; two basal joints of the flagellum incrassated, almost coalescent. Tibiæ with spurs at the tip; empodia distinct; ungues smooth.

The antennæ, bent backwards, do not reach beyond the basis of the wings; basal joint elongated cylindrical, second joint short, cyathiform; third joint elongated, incrassated; a suture a little beyond its middle indicates that it consists of two almost coalescent joints; the following joints are elongated, slender, with rather long verticils. Collare moderately developed; thoracic suture deep. Feet rather strong; the spurs at the tip of the tibiæ comparatively long and distinct. The wings (Tab. II, fig. 8, wing of *E. solatrix*) are broad and handsomely pictured in all the known species. The venation is nearly the same in the three species which I have before me: there is a strong supernumerary cross-vein between the auxiliary vein and the costa; the origin of the præfurca is very strongly arcuated, often with a stump of a vein; the petiole of the first submarginal cell is longer than the great cross-vein in *E. picta* and *fascipennis;* shorter than the

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great cross-vein in *E. solatrix;* the inner ends of the second submarginal, of the first posterior, and of the discal cells are nearly in one line; the fourth vein originates from the fifth somewhat farther than usual from the root of the wing, and its origin is very much arcuated. The abdomen has, a little before the middle of the segments, a transverse impressed line, smooth and shining at the bottom, interrupted in the middle, and of a darker coloring than the surface of the abdomen; these lines exist in several other genera, but are not so conspicuous as here. The forceps of the male is large, with an open space in the middle, even when it is closed; in structure it is not unlike that of the typical *Limnophilæ;* only both appendages fastened to the subcylindrical basal pieces seem to be of a horny texture; the inner one is flattened. The ovipositor is slender and arcuated.

Epiphragma (from ἐπί, upon, and φράγμα, partition) was introduced by me as a subgenus of *Limnophila* in the *Proc. Acad. Nat. Sci. Philad.* 1859, p. 238. It is sufficiently well characterized, however, to be permanently separated from *Limnophila.* Besides one European (*E. picta* Lin.) and two North American species, I have seen a couple of South American ones in European collections; *E. histrio* Schiner, from Columbia, is one of them (*Reise d. Novara,* etc. p. 41).

1. E. fascipennis Say. ♂ and ♀.—Alæ maculis pallide fuscis, obscure fusco-marginatis, subrotundis, confluentibus, fascias formantibus.

Wings with pale brown spots, margined with dark brown, more or less rounded, confluent, and forming bands across the wing. Long. corp. 0.45.

Syn. *Limnobia fascipennis* Say, Journ. Ac. Nat. Sc. Phil. III, 19, 1.—Wied. Auss. Zw. I, 31, 14.

Limnophila (Epiphragma) pavonina O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 239.

Head brownish, with a yellowish, sericeous reflection; palpi brown; antennæ brownish; basal joint with a yellowish bloom; the two or three basal joints of the flagellum are reddish-yellow. Thorax brownish; the mesonotum has a broad chestnut brown anterior margin; the remainder of its surface, as well as the scutellum and the metathorax, are of an opaque yellowish-gray; the separations of the usual stripes are marked by pale brownish

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lines; pleuræ with a yellowish sericeous reflection; halteres pale, basis of the knob infuscated. Abdomen brownish, with a gray dust, forming two more or less distinct longitudinal stripes along the back. Feet yellowish tawny; femora with a brown band at the tip, sometimes with a second one, preceding it; tips of the tibiæ and of the tarsi brown. Wings with a pale brown picture, the margins of which are darker brown; the spots, taken singly, are more or less circular, but most of them are confluent, so as to form several bands across the wing. Two principal bands thus formed by confluent circular spots occupy the middle of the wing; one runs from the costa across the origin of the præfurca to the tip of the seventh vein; the other is broader and begins at the costa, includes the discal cell, and ends at the posterior margin on both sides of the tips of the fifth and sixth veins; a smaller brown picture fills the basal portion of the wing, and seven almost confluent round spots, the apical portion.

Hab. United States. I have seen specimens from Georgia (Berlin Museum), Maine (Packard), and Illinois (Kennicott), and have taken them abundantly in May and June near Washington, D. C., and in the White Mountains. A number of the specimens from the latter locality have the picture on the wings very pale, almost obsolete, and, at first sight, might be taken for a different species.

2. E. solatrix O. S. ♂ and ♀.—Alæ picturâ irregulari fusco et testaceo mixtâ.

Wings with an irregular picture, which is brown, mixed with yellowish (Tab. II, fig. 8, wing). Long. corp. 0.45.

Syn. *Limnophila* (*Epiphragma*) *solatrix* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 238.

Head brownish, sericeous with yellowish; rostrum and palpi brown; antennæ brownish; basal joint dusted with gray; the second brown, the basal joint of the flagellum reddish-yellow. Thorax brownish; mesonotum of a handsome reddish-brown anteriorly, with somewhat darker stripes; the posterior part of the mesonotum, as well as the scutellum and the metathorax, are of a peculiar whitish or yellowish-white, with a sericeous reflection; pleuræ partly brown, partly sericeous with yellowish; halteres pale, a part of the knob brown; feet yellowish, with a brown band before the tip of the femora. Wings variegated with brown and tawny; the costal cell contains two angular brown

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marks, besides the two infuscated cross-veins (humeral and supernumerary); a large spot is situated at the basis of the wing, between the first longitudinal vein and the posterior margin; its anterior part is tawny, the remainder brown; a brown band begins at the posterior margin, before the tip of the seventh longitudinal vein; it extends to the fourth vein, where it assumes a tawny color and emits two branches; the posterior branch is connected with the two angular marks in the costal cell; the anterior branch expands into a large brown spot, occupying a considerable portion of the marginal cell and emitting a branch which runs along the central cross-veins, as far as the fifth vein; the apical portion of the wing contains a band, running across from the tip of the second longitudinal vein to the tips of the fifth and sixth veins; this band emits a branch towards the apex of the wing. All these bands are very irregular, and they vary in extent in different specimens; those of the apical portion of the wing are surrounded with irregular dots, streaks, etc.

Hab. Washington, D. C., in July and August. A Brazilian specimen in the Berlin Museum seems to belong to this species.

Gen. XXVIII. LIMNOPHILA.

Two submarginal cells; usually five, seldom four posterior cells; discal cell closed; subcostal cross-vein posterior to the origin of the second longitudinal vein, usually closely approximated to the tip of the auxiliary vein. Wings glabrous. Eyes glabrous. Antennæ 16-jointed. Tibiæ with spurs at the tip; empodia distinct; ungues smooth.

The diversity of forms, comprised under this definition of *Limnophila*, has already been alluded to above (p. 190). I have not been able to introduce a satisfactory natural arrangement, partly on account of the difficulty of the task, partly owing to the limited materials at my disposal, especially with regard to the European fauna. *Epiphragma* and *Ulomorpha*, two small, but apparently well circumscribed genera, I have separated from *Limnophila;* but it would be premature, I think, to do the same with some of the other subdivisions, adopted by me in 1859. Some American species, discovered by me since, do not exactly answer the definitions of those subdivisions, as I understood them at that time; often, the relationship is evident, but difficult to define in a satisfactory manner. The present genus is therefore left in an unfinished condition.

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The difficulty consists in discovering the proper characters for a subdivision. Some characters, very striking at first sight, prove, upon comparison, to be of a secondary value. We find, for instance, a number of *Limnophilæ* which, in the male sex, have the antennæ much longer than in the female, and of a different structure. This would seem a good character for a subdivision. But we soon discover that *L. tenuipes* Say, with long antennæ in the male, is very closely related to the European *L. discicollis* Meigen, and to the North American *L. recondita*, which have short antennæ in both sexes, whereas it is much less related to some other species with long antennæ in the male sex. In the same way, the number of posterior cells is a character of a very secondary value for any subdivision above a specific one; I believe, for instance, that *L. quadrata*, with four posterior cells, is more related to *L. tenuipes*, which has five, than to some other species with four posterior cells. The presence of a cross-vein in the second basal cell, upon which Macquart has based his genus *Idioptera*, is not a sufficient character to be used, unsupported by others, for the establishment of a genus. The species which Macquart would have placed in this genus are more closely related to some species without such a cross-vein (to *L. poetica*, for instance), than to the subgenus *Ephelia*, which is also distinguished by this cross-vein.

The most reliable characters to guide us are those taken from the structure of the male forceps; but in order to be available, they must be supported by characters supplied by other parts of the organization. Those *Limnophilæ* which, like the subgenera *Dactylolabis*, *Prionolabis*, and *Ephelia*, have a forceps of a very peculiar structure, are the best entitled to a separation. The remaining *Limnophilæ*, with a forceps of the typical shape (Tab. IV, fig. 24, 25), would then form a still numerous genus, subdivided in groups, indicative of different degrees of relationship between the species. I have to confine myself for the present to an account more historical than critical, of the subdivisions hitherto adopted by other authors as well as by myself; I will add to it suggestions about some affinities which I perceive, but which are of too vague a nature yet as to be available immediately.

1. The subgenus *Prionolabis* O. S. (*Proc. Acad. Nat. Sci. Philad.* 1859, p. 239), has *Limnophila rufibasis* O. S. for type;

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the outer appendages of the male forceps (Tab. IV, fig. 27, from above, open) are horny, large, strong, serrated on the inside; the inner ones (*b b* of the figure) are not parallel to the outer pair, and also different from the usual structure. The ovipositor of the female is long and remarkably straight; the feet rather stout, hairy; the antennæ comparatively short in both sexes, stout, hairy; their verticils but little apparent; the wing-veins stout, often infuscated; the venation like Tab. II, fig. 3. The new species *Limnophila munda*, described below, shares most of the above characters, and may also be considered as a *Prionolabis*.

2. The subgenus *Dactylolabis* O. S. (*Proc. Acad. Nat. Sci. Philad.* 1859, p. 240). Type: *Limnophila montana* O. S. The forceps of the male (Tab. IV, fig. 26, from above, closed; 26 *a* from the side) has digitiform appendages of a soft texture, not horny, and not overlapping each other in repose; ovipositor of the female with short, rather broad upper valves, abruptly tapering towards the tip; feet very long, slender; wings usually spotted; both branches of the second vein and the third vein are long, rather straight; first submarginal cell very long; great cross-vein near the inner end of the discal cell (Tab. II, fig. 7); head narrowed posteriorly; collare broad; antennæ comparatively short, verticils short, bristle-like. Since the adoption of this subgenus, Dr. Schiner has introduced it as a genus, including five or six European species; they are closely related to *D. montana*, and have the same spots or clouds on the cross-veins and at the origin of some of the veins, the intervals of the veins being without spots. One of the European species, *D. dilatata* Loew, is very large, and has the wings remarkably dilated anteriorly. The North American *Limnophila cubitalis*, of which I have seen only dried specimens, seems to have a forceps of a structure analogous to that of *Dactylolabis;* the ovipositor seems to be peculiar (compare the description of the species below); the venation and the structure of the antennæ are not unlike those of *Dactylolabis;* but the feet are stouter, and the wings without any spots. If I had followed Dr. Schiner's precedence in adopting *Dactylolabis* as a genus, I would have been in doubt whether this species belongs to it or not. *Rhicnoptila* Now. (*Verh. Zool. Bot. Ges. in Wien*, 1867), specimens of which were kindly communicated to me by Dr. Schiner, is a *Dactylolabis* with somewhat abortive wings. The wings are shorter than the abdomen, rather narrow; the venation

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is that of *Dactylolabis*, with the following differences: the discal cell is open and coalescent with the fourth posterior cell; there is a supernumerary cross-vein in the first submarginal cell. The body is shorter and stouter, the feet stronger than in *Dactylolabis*. These differences notwithstanding, I do not think that the separation of *Rhicnoptila* from *Dactylolabis* is necessary. The only species, *R. wodzickii*, occurs in Austria.

3. The subgenus *Lasiomastix* O. S. (*Proc. Acad. Nat. Sci. Philad.* 1859, p. 233). Very long filiform antennæ in the male, about as long as the body, with a long, erect pubescence on the flagellum; palpi unusually long; forceps somewhat peculiar, etc. (compare below, the description of the species). Only a single North American species, *L. macrocera* Say, is known. The *Limnophila longicornis* Loew, contained in amber, seems to be related to this species.

4. Subgenus *Dicranophragma* O. S. (*Proc. Acad. Nat. Sci. Philad.* 1859, p. 240), distinguished by a cross-vein, connecting both branches of the second vein. The only North American species, *D. fuscovaria*, is a delicate, rather small species, with slender feet and broad wings, rounded posteriorly, and densely spotted with brown.

5. *Idioptera*, introduced as a genus by Macquart (*Hist. Natur. Dipt.* I, p. 94), has been adopted in Dr. Schiner's work (l. c. II, p. 548). It is principally based upon the presence of a supernumerary cross-vein in the second basal cell. The antennæ of the male are much longer than those of the female, filiform, pubescent; the body slender, the wings banded with brown, etc. Two European and one North American species are known; they are very closely allied, and the picture of their wings is nearly the same. The wings in the female of one of the European species are abortive.

6. *Ephelia*, a genus introduced by Dr. Schiner (l. c. II, p. 549), is likewise based upon the presence of a supernumerary cross-vein in the second basal cell; the antennæ are short in both sexes, the wings are rather broad and spotted with brown, the spots lying along the margin and on the veins. Two European and one American species are known. The forceps of the latter (Tab. IV, fig. 23) has the outer horny appendages stout, blunt, bifid at the tip, and therefore sufficiently distinct from the usual

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type of the genus *Limnophila*. I have not had an opportunity to examine the forceps of the European species.

7. *Pœcilostola*, a genus adopted by Dr. Schiner (l. c. II, p. 551) for four European species of large size and with spotted wings. No American species, belonging here, are known as yet; and I have not had sufficient opportunity to study the European species. *P. pictipennis* reminds of *Limnophila luteipennis* in the structure of its head and thorax; *P. punctata* is quite different in this respect, and *P. barbipes* still more so. The above-quoted species, it seems to me, show a leaning towards *Prionolabis* on one side, and to the group of which *L. luteipennis* O. S. is the type on the other. Like the latter group, the species of *Pœcilostola* have the pits on the humeral part of the mesonotum very distinct, and also the corresponding blackish double dots on the front part of the intermediate stripe of the thorax.

8. *Limnophila luteipennis* O. S., *L. contempta*, n. sp., and *L. inornata*, n. sp., form a natural group, distinguished by the structure of the head, narrowed behind; a neck-like prolongation of the collare; the venation (length of the second submarginal cell, arcuated course of the posterior branch of the second vein, incurved tip of the seventh vein, etc, compare Tab. II, fig. 10, the wing of *L. luteipennis*); the structure of the antennæ, the joints of the flagellum of which are rather elongated, with distinct, but moderately long verticils, etc. These species have very distinct pits on the humeral part of the mesonotum, and a corresponding double dot on the anterior part of the intermediate thoracic stripe. Their forceps (Tab. IV, fig. 25, forceps of *L. luteipennis*, half open) has nothing peculiar in its structure, and belongs to a type rather common among the *Limnophilæ*. I have seen one or two European species belonging to the same group.

9. *Limnophila tenuipes* Say, *imbecilla* O. S., *recondita* O. S., and the European *discicollis* Meig., are evidently allied; their venation is the same; the inner ends of the second submarginal and first posterior cells are in one line; the small cross-vein is perceptibly arcuated; the first submarginal cell is short and has a long petiole; the præfurca is long and forms a very straight line with this petiole; the auxiliary vein is comparatively short, and ends before the inner end of the second submarginal cell; the marginal cross-vein is generally somewhat oblique, etc. The joints of the flagellum are elongated, slender, with very long

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verticils (the antennæ of *L. tenuipes*, ♂, are very long, filiform; compare the description of this species). The venation of this group resembles that of *L. quadrata* O. S. (Tab. II, fig. 9), although the latter has only four posterior cells, and this resemblance may be indicative of a relationship. The same remark, although in a lesser degree, may apply to the venation of the genus *Ulomorpha*.

Some general remarks on the venation of *Limnophila* may find their place here:—

1. The marginal cross-vein is apt to be very weakly marked in many species of *Limnophila;* but I have never found it absolutely wanting. I perceive it in two European specimens of *Idioptera*, although Dr. Schiner mentions the absence of this vein among the characters of the genus.

2. *Rhicnoptila* (compare above, page 198) is the only *Limnophila* with an open discal cell, which I have seen, and this exceptional case is evidently due to the abnormal and abortive condition of the whole wing. But it is worthy of notice that in *Rhicnoptila*, as well as in those single specimens of *Limnophila* in which the discal cell is adventitiously open, the anterior branch of the fourth vein bears a double fork, similar to that of *Dolichopeza*, the posterior branch having no fork at all. In the *Amalopina*, when the discal cell is open, each of the branches of the fourth vein has a fork (compare above, p. 191).

3. The great cross-vein in the genus *Limnophila* is very often nearer to the middle than to the inner end of the discal cell; in the subgenus *Dactylolabis*, however, it is usually near the inner end of this cell.

4. The venation is always somewhat variable in different specimens of the same species, which applies especially to the relative length of the petioles of the first submarginal and of the second posterior cells; also to the position of the great cross-vein, and of the marginal cross-vein. These variations ought to be taken into account in reading the descriptions of the species.

Several larvæ of *Limnophila* have been observed; those of *L. punctata* M. by Scheffer (in Rossi's *System. Verz. Oesterr. Dipt.* p. 10), in decayed beech-wood; *L.* (*Epiphragma*) *picta* by Bremi, in oak-wood; *L. dispar* M. by Perris (*Ann. Soc. Entom. de Fr.* 1849, p. 331, Tab. VII, fig. 5), in dry stems of *Angelica sylves-*

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tris, in which the larva dug longitudinal burrows. The latter larva is the only one which has been described and figured in detail. It is cylindrical, glabrous, of a livid gray, with a horny, black head; its structure is in no way distinguished from the other larvæ of the *Tipulidæ*, as described in the Introduction to this volume. I have already observed above (p. 4) that Mr. Heeger's (*Sitzungsber. d. Wien. Acad.* Vol. XI) description of the larva of *Limnophila platyptera* Macq. is evidently erroneous; the larva is apparently that of *Bolitophila*. I may also remark here that *Limnobia platyptera* Macq. quoted by Dr. Schiner (*Dipt. Austr.* II, p. 572), among the unknown species of doubtful location, cannot well be anything else but *Limnophila hospes* Egger (l. c. p. 554).

Table for determining the species.

1 { Five posterior cells. 2
  { Four posterior cells. 26

2 { A supernumerary cross-vein in the second basal or in the first submarginal cell. 3
  { No supernumerary cross-vein in the second basal or in the first submarginal cell. 5

3 { A supernumerary cross-vein in the second basal cell. 4
  { A supernumerary cross-vein in the first submarginal cell. 20 **fuscovaria** *O. S.*

4 { Antennæ of the male much longer than those of the female. 3 **fasciolata** *O. S.*
  { Antennæ of the male not conspicuously longer than those of the female. 19 **aprilina** *O. S.*

5 { Thorax shining black. 6
  { Thorax not shining black. 7

6 { Wings with large brown spots. 1 **macrocera** *Say.*
  { Wings not spotted. 22 **munda**, n. sp.

7 { Marginal cross-vein some distance from the tip of the first longitudinal vein. 8
  { Marginal cross-vein at the tip of the first longitudinal vein, which is incurved immediately beyond it. 18

8 { Inner end of the second submarginal cell considerably anterior to the inner end of the first posterior cell. 9
  { Inner end of the second submarginal cell in a line with the first posterior cell, or almost so. 12

9 { Petiole of the first submarginal cell three or four times shorter than this cell. 10
  { Petiole of the first submarginal cell nearly as long as this cell. 18 **ultima** *O. S.*

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10 { Wings with some indistinct clouds along the second longitudinal vein and on the central cross-veins. 13 **luteipennis** *O. S.*
Wings of a uniform coloring, without spots or clouds. 11

11 { Halteres yellow. 15 **inornata**, n. sp.
Knob of the halteres brownish. 14 **contempta**, n. sp.

12 { Discal cell very much elongated, its inner end conspicuously anterior to the inner end of the first posterior cell. 11 **areolata** *O. S.*
Discal cell of the ordinary size; its inner end not anterior to the inner end of the first posterior cell. 13

13 { Petiole of the first submarginal cell not longer than the great cross-vein. 14
Petiole of the first submarginal cell distinctly longer than the great cross-vein. 15

14 { Petiole of the second posterior cell not longer than this cell. 5 **tenuicornis**, n. sp.
Petiole of the second posterior cell three or four times longer than this cell. 17 **brevifurca** *O. S.*

15 { Thorax gray, with four brownish stripes (*L. ultima*). 9
Thorax yellowish or brownish. 16

16 { Antennæ of the male much longer than those of the female; thorax brown above. 7 **tenuipes** *Say.*
Antennæ of the same length in both sexes; thorax reddish or yellowish above. 17

17 { Thorax shining above. 8 **recondita**, n. sp.
Thorax opaque above; front gray. 9 **imbecilla** *O. S.*

18 { Thorax gray, or brownish-gray. 19
Thorax yellow, or brownish-yellow. 24

19 { Great cross-vein usually at the inner end of the discal cell. 20
Great cross-vein nearer to the middle of the discal cell. 21

20 { Wings spotted with brown. 23 **montana** *O. S.*
Wings immaculate. 24 **cubitalis**, n. sp.

21 { Hind tarsi white. 6 **niveitarsis**, n. sp.
Hind tarsi not white. 22

22 { Wings spotted with brown. 2 **unica**, n. sp.
Wings not spotted with brown. 23

23 { Fifth longitudinal vein and central cross-veins margined with narrow brown clouds. 21 **rufibasis** *O. S.*
Wings unicolorous. 16 **fratria**, n. sp.

24 { Petiole of the first submarginal cell twice the length of the great cross-vein, and conspicuously arcuated. 10 **toxoneura** *O. S.*
Petiole of the first submarginal cell not longer than the great cross-vein. 25

25 { Antennæ of the male more than twice the length of the thorax. 4 **poetica**, n. sp.
Antennæ of the male shorter than the thorax. 12 **adusta** *O. S.*

26 { Body gray. 25 **quadrata** *O. S.*
Body yellow. 26 **lenta** *O. S.*

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Synoptical table of the species.[1]

I. *Five posterior cells.*

A. Antennæ of the male much longer than those of the female.

1 **macrocera** *Say.*
2 **unica**, n. sp.
3 **fasciolata** *O. S.*
4 **poetica**, n. sp.
5 **tenuicornis**, n. sp.
6 **niveitarsis**, n. sp.
7 **tenuipes** *Say.*

B. Antennæ of the male not conspicuously longer than those of the female.

8 **recondita**, n. sp.
9 **imbecilla** *O. S.*
10 **toxoneura** *O. S.*
11 **areolata** *O. S.*
12 **adusta** *O. S.*
13 **luteipennis** *O. S.*
14 **contempta**, n. sp.
15 **inornata**, n. sp.
16 **fratria**, n. sp.
17 **brevifurca** *O. S.*
18 **ultima** *O. S.*

(Subg. **EPHELIA.**)
19 **aprilina** *O. S.*
(Subg. **DICRANOPHRAGMA.**)
20 **fuscovaria** *O. S.*
(Subg. **PRIONOLABIS.**)
21 **rufibasis** *O. S.*
22 **munda**, n. sp.
(Subg. **DACTYLOLABIS.**)
23 **montana** *O. S.*
24 **cubitalis** *O. S.*

II. *Four posterior cells.*

25 **quadrata** *O. S.*
26 **lenta** *O. S.*

Description of the species.

I. *Five posterior cells.*

A. Antennæ of the male much longer than those of the female.

1. L. macrocera Say. ♂ and ♀.—Nigra, nitida; antennæ maris longitudine corporis, filiformes, pilosæ; alæ fusco maculatæ.

Black, shining; antennæ of the male as long as the body, filiform, beset with hairs; wings spotted with brown. Long. corp. 0.3—0.4.

Syn. *Limnobia macrocera* Say, Journ. Acad. Phil. III, p. 20, 2.—Wiedemann, Auss. Zw. I, 34, 19.
Cylindrotoma macrocera Macquart, Hist. Nat. Dipt. I, 108, 2.
Limnophila (Lasiomastix) macrocera O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 234.

Head black, shining; front above the antennæ, and lower part of the head yellowish-ferruginous; rostrum and palpi black; antennæ black, except the basal joints, which are reddish; an-

[1] This arrangement is purely artificial and therefore provisional; compare p. 197.

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tennæ of the male as long or a little longer than the body, slender, filiform; two basal joints short, the following elongated, cylindrical, of nearly equal length, clothed with soft, erect hairs; the third and fourth joints have a small spine on the under side, at the tip; antennæ of the female setaceous, not reaching much beyond the basis of the wing; joints cylindrical, clothed with sparse hairs; palpi unusually long, longer than the head; last joint elongated. Thorax black, shining; pleuræ slightly hoary; halteres pale yellow, the knob sometimes infuscated; feet dark tawny; coxæ and basis of femora paler; tips of the femora, of the tibiæ, and of the tarsi brown. Abdomen black; three or four intermediate segments with pale ferruginous spots at the basis (more distinct in living specimens); genitals ferruginous-yellow. Wings hyaline, spotted with brown; a spot at the inner end of the basal cells; a large square one, between the first and fifth longitudinal veins, across the origin of the præfurca; a third one between the costa and the discal cell; the tip of the wing, as well as the cross-veins, is clouded; petiole of the first submarginal cell very short, sometimes almost obsolete; the second submarginal very little longer than the first posterior cell; the marginal cross-vein is close at the tip of the first longitudinal vein.

Hab. United States; not common. I found male specimens quite commonly on the 2d of July, 1859, near the so-called Salt-pond, in southern Virginia (about twenty miles from the Montgomery White Sulphur Springs). I caught this species in Florida, in March, 1858. Quebec (Couper); Illinois (LeBaron).

The forceps of the male is like that of the typical *Limnophilæ*, that is, the two pairs of movable appendages are subparallel; the outer one is slender and pointed; the inner one short, stout, with the point turned upwards. (About the subgenus *Lasiomastix*, compare p. 199.)

N. B.—Say commits a mistake when he compares the venation to Meig. I, Tab. V, fig. 7. Wiedemann quotes correctly Meig. I, Tab. VI, fig. 3.

2. L. unica, n. sp. ♀.—Thorace cinereo, antennis fuscis, articulis basalibus brevibus, rufis; alis stigmate obscure fusco, præfurcæ basi et venulis transversis fusco-nebulosis; cellulis submarginali secundâ et posteriori primâ subæque longis.

Thorax gray, antennæ brown, basal joints short, reddish; wings with a dark-brown stigma; brownish clouds at the origin of the præfurca and

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on the cross-veins; second submarginal and first posterior cells nearly of the same length. Long. corp. 0.35.

Head yellowish-gray above; rostrum and palpi brown; antennæ brown, basal joints reddish; those of the female (the only sex I have before me) are longer than the head and the thorax taken together; the first joint is very short, not longer than the second; the joints of the flagellum are elongated, subcylindrical, with moderately long verticils in the middle. Thorax yellowish-gray, this color being produced, on the mesonotum, by a dense gray bloom, apparently upon a darker ground; pleuræ somewhat hoary; halteres yellowish, with a faintly brownish knob. Abdomen brown, with short scattered yellowish hairs; ovipositor rather short, moderately arcuated; coxæ and femora tawny, tibiæ and tarsi brown. Wings with a brownish tinge; stigma dark brown; a pale brown cloud at the origin of the præfurca; another one on the central cross-veins; smaller clouds on the great cross-vein, and the cross-veins at the inner end of the third and fourth posterior cells. Tip of the auxiliary vein nearly opposite the inner end of the second submarginal cell; the petiole of the first submarginal cell is but little shorter than the upper branch of the second longitudinal vein; the marginal cross-vein is at the tip of the first longitudinal vein, a short distance beyond the inner end of the first submarginal cell; the second submarginal cell is only slightly longer than the first posterior; the great cross-vein is opposite the middle of the discal cell; the latter is elongated.

Hab. White Mountains, N. H.; a single female.

The structure of the antennæ of the female renders it very probable that the male has much longer antennæ, and it is on this supposition that this species is placed among those with elongated male antennæ.

3. L. fasciolata n. sp. ♂.—Ferrugineo-flava, thorace cinerascente, antennis maris thorace multo longioribus, articulis elongatis, pubescentibus; alis fusco-fasciatis et maculatis; præfurcæ basi appendiculatâ; venula transversa supernumeraria in cellulâ basali secundâ.

Ferruginous-yellow, thorax grayish; antennæ of the male much longer than the thorax; joints elongated, pubescent; wings banded and spotted with brown; a stump of a vein at the origin of the præfurca; a supernumerary cross-vein in the second basal cell.

Syn. *Limnophila fasciata* O. Sacken (non Schum.), Proc. Ac. Nat. Sc. Phil. 1859, p. 234.

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Front and vertex brownish, with a gray bloom; rostrum and palpi brown; antennæ brownish, basal joints yellowish; those of the male are much longer than the thorax; first joint rather short; joints of the flagellum elongated, subcylindrical, densely pubescent, and with a few verticils about the middle; thorax brownish above, with a yellowish-gray bloom; pleuræ yellowish; halteres with a brown knob; abdomen reddish-yellow, posterior margins of the segments brown; last segment brownish; forceps yellow. Wings almost hyaline, banded and spotted with brown as follows: the inner end of the basal cells, the costal and subcostal cells, three large spots at the origin of the præfurca, on the supernumerary cross-vein of the second basal cell, and at the tip of the seventh vein; these spots are almost, but not quite in contact, and thus form an interrupted band; the first spot is connected with the brown of the anterior margin; the brown stigma and a series of spots along the central cross-veins form a second cross-band; the apex of the wing is infuscated, and there are clouds at the inner ends of the three intermediate posterior cells. Marginal cross-vein near the tip of the first vein; præfurca with a stump of a vein near its origin; the inner ends of the second submarginal, first posterior, and the discal cells nearly in a line.

Hab. Massachusetts (Mr. Scudder); a single male.

My only specimen is somewhat injured, the feet and the tips of the antennæ being broken. This species is very like the European *Limnophila* (*Idioptera*) *pulchella* Meig. (syn. *L. fasciata* Schum. non Linn. according to Dr. Schiner). It may be that they are the same species, and it is upon this assumption that I introduced the American species as *L. fasciata* Schum., in my former paper. The European species has generally abortive wings in the female sex (compare Schum. *Beitr.* etc. Tab. V, fig. 2). *L. fasciolata* is closely allied to *L. poetica*, and it would be unnatural to separate them on account of the presence of the supernumerary cross-vein of the former. (About *Idioptera* compare p. 199.)

4. L. poetica, n. sp. ♂.—Ferrugineo-flava, antennis fuscis, articulis basalibus flavis; in mare thorace plus quam duplo longioribus, articulis elongatis, pubescentibus; alæ immaculatæ, stigmate pallide infuscato, præfurcæ basi appendiculatâ.

Reddish-yellow, antennæ brown, basal joints yellow; in the male the antennæ are more than twice the length of the thorax; joints elongated,

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pubescent; wings immaculate; stigma pale brownish; a stump of a vein near the origin of the præfurca. Long. corp. 0.35.

Head reddish-yellow, with a grayish bloom on the front; palpi brown; antennæ more than twice the length of the thorax, brown, two basal joints yellowish, the second somewhat infuscated; joints of the flagellum elongated, cylindrical, clothed with a dense, delicate pubescence; a few short verticils about the middle of the joints. Thorax reddish-yellow, somewhat shining above, sometimes with faintly-marked brownish stripes; pleuræ with an opaque yellowish bloom; halteres with a brownish knob. Feet tawny; tips of the femora and of the tibiæ brown. Abdomen yellow; last segment brown; forceps yellow. Wings with a faint pale brownish tinge; stigma pale brown; a faint, small pale brown cloud at the origin of the præfurca (sometimes obsolete); marginal cross-vein at the tip of the first longitudinal vein; petiole of the first submarginal cell about the length of the great cross-vein; this cell is very narrow in its basal half, broader towards the tip; the inner end of the second submarginal cell very little anterior to the inner ends of the first posterior and of the discal cells; the petiole of the second posterior cell is nearly of the same length with the cell itself (sometimes longer); the great cross-vein is a little anterior to the middle of the discal cell; there is a stump of a vein near the origin of the præfurca.

Hab. Milton, Mass., May 18th (Mr. Scudder); four male specimens.

5. L. tenuicornis, n. sp. ♂ and ♀.—Nigrescens, cinereo-pollinosa, antennis nigris, in mare thorace multo longioribus, articulis elongatis, pubescentibus; in femina longitudine thoracis; halteres capitulo infuscato, abdomen cum forcipe nigro-fusci; alæ immaculatæ, stigmate pallido.

Blackish, with a grayish pollen, antennæ black, those of the male much longer than the thorax, joints elongated, pubescent; those of the female of the length of the thorax; halteres with a brownish knob; abdomen and forceps blackish-brown; wings immaculate, stigma pale. Long. corp. 0.28—0.32.

Head black, clothed with a gray bloom; rostrum and palpi brown; antennæ black; those of the male, if bent backwards, would reach the second abdominal segment; joints of the flagellum elongated, slightly attenuated at both ends, clothed with a

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delicate, dense pubescence; a few verticillate delicate hairs about the middle of each joint; antennæ of the female shorter than those of the male; bent backwards, they would reach the end of the thorax; the flagellum is clothed with scattered hairs, and shows no vestige of a pubescence, except on the underside of the joints near the basis. Ground-color of the thorax brownish-black, clothed with a grayish bloom; the space usually occupied by the stripes has less of this bloom, and is therefore darker, somewhat shining, clothed with a short, delicate, erect, yellowish-gray pubescence; the stripes are not well defined, although their general outline is marked by the more dense gray bloom surrounding them. Halteres pale, knob brownish. Coxæ yellow, the front ones brownish at the extreme basis; feet brown, femora yellowish towards the basis. Abdomen blackish-brown; venter yellowish, except at the tip, where it is brown; forceps brownish-black; ovipositor elongated, slender, gently curved. Wings with a slight pale brownish tinge; stigma colorless; tip of the auxiliary vein a little before the inner end of the second submarginal cell; præfurca arcuated near the origin, otherwise quite straight; petiole of the first submarginal vein short; the marginal cross-vein is about the middle of the distance between the tip of the first longitudinal vein and the inner end of the first submarginal cell; the inner ends of the second submarginal and first posterior cells are nearly in one line; the inner end of the discal cell is slightly anterior to them; the great cross-vein is nearly opposite the middle of the discal cell; petiole of the second posterior cell usually shorter than the cell itself; fifth longitudinal vein arcuated at the tip; the apex of the wing is finely pubescent.

Hab. White Mountains, N. H., in July. Three male and one female specimen.

6. L. niveitarsis, n. sp. ♂ and ♀.—Thorace nigro, cinereo-pollinoso; antennis nigris, in mare thorace multo longioribus, articulis elongatis, pubescentibus; in feminâ thorace brevioribus: abdomen fuscescens, forceps in mare flavus; tarsi postici albi; alæ immaculatæ; stigmate pallide fuscescente.

Thorax black, with a gray pollen; antennæ black, much longer than the thorax in the male; shorter than the thorax in the female; abdomen brownish; forceps of the male yellow; hind tarsi white; wings immaculate; stigma with a pale brownish tinge. Long. corp. 0.25.

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Head black; front broad, with a gray, almost silvery reflection; antennæ of the male more than double the length of head and thorax taken together; first joint very short; joints of the flagellum long, cylindrical, clothed with a dense, delicate pubescence; the verticils are hardly perceptible; the antennæ of the female, when bent backwards, would hardly reach the root of the wings; joints short, oval, the basal ones of the flagellum truncate at the end; with scattered hairs and inconspicuous verticils among them. Ground color of the thorax black, clothed above with a yellowish-gray pollen, and therefore but faintly shining; stripes hardly marked; pleuræ somewhat hoary; halteres yellowish. Coxæ yellow; feet brownish-tawny, pubescent; femora and tibiæ, towards the tip, brownish; hind tarsi, except the tip, white. Abdomen brown (in some specimens mixed with yellowish); male forceps yellow. Wings with a faint brownish tinge; stigma pale brownish; tip of the auxiliary vein nearly opposite the inner end of the second submarginal cell; petiole of the first submarginal cell about equal in length to the great cross-vein; marginal cross-vein faintly marked, close by the tip of the first longitudinal vein; inner end of the second submarginal cell somewhat anterior to the inner end of the first posterior cell; in some specimens the inner end of the third posterior cell is almost pointed, the cross-vein separating it from the discal cell being very short; in other specimens, however, this is not the case; great cross-vein nearly opposite the middle of the discal cell, somewhat variable in its position.

Hab. Delaware (Dr. Wilson); Maryland (Cresson). Three male and one female. The tip of the abdomen of the female is broken off.

7. L. tenuipes Say. ♂ and ♀.—Brunnea, humeris pleurisque ochraceis; antennis maris thorace multo longioribus, articulis elongatis, pubescentibus; alæ immaculatæ, pallide infuscatæ.

Brown, humeri and pleuræ ochraceous; antennæ of the male much longer than the thorax; joints elongated, pubescent; wings immaculate, with a pale brownish tinge. Long. corp. 0.3—0.4.

Syn. *Limnobia tenuipes* Say, Journ. Acad. Nat. Sc. Phil. III, p. 21, 3.
Limnobia humeralis Wied. (non Say), Auss. Zw. I, p. 34.
Limnophila tenuipes O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 235.

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Rostrum ochraceous, palpi dark brown; front brownish, with a gray bloom; antennæ brown, paler at the basis; those of the male about once and a half the length of the thorax, filiform; joints subcylindrical, elongated, clothed with a dense pubescence; a few verticillate hairs on each joint of the flagellum; the antennæ of the female are shorter than those of the male, but longer than the thorax; joints elongated; no pubescence, but long verticils. Thorax brown above, this color occupying the space of the ordinary stripes, which are not otherwise marked; humeri and pleuræ ochraceous; scutellum and metathorax brown; the knob of the halteres is more or less infuscated; feet long, slender, dark tawny, pale at the basis, darker at the tips of the femora and of the tibiæ; coxæ ochraceous. Abdomen brown, venter paler. The tip of the auxiliary vein is some distance anterior to the inner end of the second submarginal and first posterior cell, which are in one line; the marginal cross-vein is some distance anterior to the tip of the first longitudinal vein, close by the inner end of the first submarginal cell; the præfurca is long, straight, in one line with the petiole of the first submarginal cell, which is rather long, longer than the great cross-vein; the small cross-vein is arcuated; the great cross-vein is usually about the middle of the discal cell. The wings are slightly tinged with brownish; the stigma is more or less brown; sometimes quite pale.

Hab. United States; not rare. Washington, D. C., Savannah, Ga.; Canada (Couper); Illinois (LeBaron).

Say's descriptions of *L. tenuipes* and *L. humeralis* are so much alike that the choice between them was somewhat difficult in identifying the present species. Still, the words in the description of *L. tenuipes*, "antennæ long" and "wings dusky," determined my choice. Wiedemann took both for synonyms; but Say denies this synonymy in a manuscript note, which I discovered in a copy of Wiedemann's work, in the library of the Academy of Natural Sciences in Philadelphia. That Wiedemann's *L. humeralis* is the present species, results from his comparing it to *L. discicollis* Meig. And, indeed, these species are most closely allied, with the only exceptions that the European species is slightly larger, and that the antennæ of the male are like those of the female, and not at all elongated and pubescent as those of *L. tenuipes*. The coloring and the venation of both species are precisely the same.

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B. Antennæ of the male not perceptibly longer than those of the female.

8. L. recondita, n. sp. ♂ and ♀.—Flavo-ferruginea, nitens, antennis utriusque sexus longitudine mediocri, verticillis longis; alis fusco-flavescentibus, stigmate concolori; petiolo cellulæ submarginalis primæ longo; cellulis submarginali secundâ et posteriori primâ æque longis.

Yellowish-red, shining, antennæ of moderate length in both sexes; verticils long; wings with a yellowish-brown tinge; stigma of the same color; the petiole of the first submarginal cell is long; the second submarginal and first posterior cells are of the same length. Long. corp. 0.35—0.4 (sometimes smaller).

Head yellowish-red or brownish, front shining, with some black hairs; palpi brown; first joint of the antennæ, and sometimes the basis of the second, yellowish; the remainder of the antennæ brownish, gradually darker towards the tip; first two or three joints of the flagellum rounded, the following elongated; verticils long; bent backwards, the antennæ would hardly reach the basis of the wings. Thorax yellowish-red, or reddish-yellow, in some specimens brownish-red; it is more or less shining above and on the pleuræ; the humeri are not perceptibly paler than the rest of the mesonotum; the pleuræ but slightly paler, also shining; halteres pale, sometimes faintly brownish. Feet yellowish-tawny, faintly infuscated at the tips of the femora, of the tibiæ, and of the tarsi. Abdomen reddish- or yellowish-brown; forceps of the male of the same color; ovipositor long, slender, very slightly arcuated. Wings with a yellowish-brown tinge; stigma not darker; tip of the auxiliary vein slightly anterior to the inner end of the second submarginal cell, which is in one line with the small cross-vein; the latter gently arcuated; præfurca as long as the first posterior cell, straight, in one line with the petiole of the first submarginal cell; this petiole is as long as the anterior branch of the second vein; the oblique marginal cross-vein is close at the basis of this anterior branch; the great cross-vein (slightly variable in its position) is usually about the middle of the discal cell.

Hab. New York, Pennsylvania, Georgia, etc. Twenty specimens.

The venation of this species is almost exactly like that of *L. tenuipes* Say; the long verticils of the antennæ, the length of the

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ovipositor, etc., prove the relationship of these species, the difference in the length of the male antennæ notwithstanding. The size of this species is somewhat variable. In some specimens the præfurca has a stump of a vein near its origin.

9. L. imbecilla O. S. ♂ and ♀.—Pallide ochracea, fuscescens, opaca, fronte cinerascente; antennis utriusque sexus longitudine mediocri, verticillis longis; alis pallide fusco-flavescentibus, stigmate concolori; petiolo cellulæ submarginalis primæ longo; cellulis submarginali secundâ et posteriori primâ æque longis.

Pale brownish-ochraceous, opaque, front grayish; antennæ of both sexes of moderate length, with long verticils; wings with a pale yellowish-brown tinge; stigma concolorous; the petiole of the first submarginal cell is long; the second submarginal and first posterior cells are of the same length. Long. corp. 0.33—0.38.

Syn. *Limnophila imbecilla* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 237.

This species is remarkably like the preceding in all the important characters; it is slightly smaller, and the wings are narrower; besides these, the only striking differences consist in the coloring. The body is entirely opaque; the front is gray; the thorax pale yellowish, of a more saturate color above; pleuræ and metathorax slightly hoary; the first joint of the antennæ is brownish, with a gray bloom above, the basis of the flagellum paler; the wings have a slight yellowish-gray tinge. All the other characters, including the structure of the antennæ and the venation, are like those of *L. recondita*.

Hab. Trenton Falls, N. Y.; Maryland (Cresson). In one specimen the stigma is faintly brownish. The indicated differences, notwithstanding, it is not impossible that this species is only a variety of the preceding.

10. L. toxoneura O. S. ♂ and ♀.—Pallide ochracea, fuscescens; antennis utriusque sexus longitudine mediocri, fuscis; alis subhyalinis, stigmate pallide infuscato; petiolo cellulæ submarginalis primæ longo, conspicue arcuato; cellulis submarginali secundâ et posteriori primâ subæque longis.

Pale ochraceous, brownish; antennæ in both sexes of moderate length, brown; wings subhyaline stigma pale brownish; petiole of the first submarginal cell long, conspicuously arcuated; second submarginal and first posterior cells almost of the same length. Long. corp. 0.3—0.35.

Syn. *Limnophila toxoneura* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 236.

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Front grayish; palpi infuscated; rostrum yellowish; antennæ brown; basis of the third joint pale; joints of the flagellum elongated-elliptical; verticils moderate. Thorax brownish-yellow with two pale brown stripes, which become paler near the collare, where they communicate with a brown spot near the humerus; they extend beyond the suture posteriorly; pleuræ pale, sometimes with a pale brown stripe; halteres pale, slightly infuscated; feet pale tawny, tips slightly infuscated. Abdomen brownish; ovipositor arcuated, of moderate length. Wings slightly tinged with grayish; stigma faintly infuscated; marginal cross-vein at the tip of the first longitudinal vein; præfurca gently arcuated, rather short, not longer than the petiole of the first submarginal cell; this petiole is conspicuously arcuated; the branches of the second vein are nearly parallel, except at the basis; the second submarginal cell is only a trifle longer than the first posterior; the second posterior cell rather long, in comparison to its petiole (the relation between them is variable); the great cross-vein is usually opposite the middle of the discal cell.

Hab. Trenton Falls, N. Y.

This species is easily distinguished by the arcuated petiole of its first submarginal cell.

11. L. areolata O. S. ♂ and ♀.—Ochracea; alæ subhyalinæ, immaculatæ; cellulâ discoidali elongatâ; ejus angulus interior et præfurcæ initium ab alæ basi fere æque distantes; cellulæ submarginalis secunda et posterior prima longissimæ; præfurca brevis.

Ochraceous; wings subhyaline, immaculate; discal cell elongated; its inner end not much more distant from the basis of the wing than the origin of the præfurca; the second submarginal and the first posterior cells are very long; præfurca short. Long. corp. 0.27—0.32.

Syn. *Limnophila areolata* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 237.

Ochraceous yellow, antennæ, except the basal joint, slightly infuscated; front sometimes with a yellowish-gray bloom; knob of the halteres more or less infuscated; abdomen brownish above, venter pale; forceps ochraceous; ovipositor long, slender, very slightly curved; feet yellowish, the latter part of the tibiæ and the tarsi, except at the basis, brownish; sometimes the tibiæ are altogether yellowish. The antennæ, if bent backwards, would not reach much beyond the root of the wings; the joints of the flagellum are about twice longer than broad, gradually becoming

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more slender towards the tip; the verticils are of moderate length. Wings subhyaline, with a slight yellowish or brownish tinge; veins somewhat pubescent; those near the costa yellowish, the other veins brownish; stigma pale, sometimes very slightly infuscated; the most striking character of the venation is the shape of the discal cell (Tab. II, fig. 6); it is long and narrow; its inner end reaches the middle of the length of the wing, and is but little more distant from the basis of the wing than the origin of the præfurca; the second submarginal and first posterior cells are also very long, and have their inner ends exactly in one line, at a distance beyond the inner end of the discal cell, which is about equal to the great cross-vein or longer; the length of these cells causes the præfurca to be very short, distinctly shorter than the discal cell; the petiole of the first submarginal cell is about equal to the præfurca in length, or a little longer; this cell is elongated, sometimes angular at its inner end; the marginal cross-vein is very faint, about the middle of the distance between the tip of the first longitudinal vein and the inner end of the first submarginal cell; the subcostal cross-vein is at a distance from the tip of the auxiliary vein, which is a little shorter than the length of the great cross-vein; great cross-vein more or less near the middle of the discal cell, often a little beyond it.

Hab. Trenton Falls, N. Y.; Maryland; Washington, D. C. Not rare in May and June.

12. L. adusta O. S. ♂ and ♀.—Flava, thorace ferrugineo, nitido, fronte cinereâ; præfurcâ brevi, arcuatâ; alarum margine apicali infuscato.

Yellow, thorax reddish, shining, front gray; præfurca short, arcuated; apical margin of the wings clouded with brown. Long. corp. 0.3—0.5.

Syn. *Limnophila adusta* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 235.

I possess a series of specimens, varying considerably in their size and in the coloring of their wings, but having the following characters in common:—

Head gray, opaque above; rostrum brownish-yellow, palpi brown; antennæ short in both sexes, yellowish, basal joint sometimes darker; verticils of moderate length, black; basal joints of the flagellum elongated-elliptical, becoming more long and

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slender towards the tip. Thorax reddish-yellow, shining above, sometimes with a faint longitudinal brown line in the middle; pleuræ paler yellow, with a hardly perceptible yellowish bloom, which is also perceptible beyond the suture above; halteres with a more or less infuscated knob. The auxiliary vein is nearly opposite the inner end of the second submarginal cell; its tip has the appearance of being incurved towards the first longitudinal vein, whereas the cross-vein seems to be placed between it and the costa; the præfurca is arcuated at its origin, and remarkably short, not longer than one-third of the length of the second submarginal cell; petiole of the first submarginal cell of moderate length, sometimes but little longer than the small cross-vein, sometimes about the length of the great cross-vein; first submarginal cell gradually tapering towards its inner end; second submarginal cell a little longer than the first posterior; marginal cross-vein at the tip of the first longitudinal vein, and not far from the middle of the anterior branch of the second vein; great cross-vein usually about the middle of the discal cell; seventh longitudinal vein slightly sinuated in the middle, and somewhat curved in the opposite sense at the tip. The tip of the wing, between the stigma and the apex, is more or less distinctly clouded with brown along the margin. The ovipositor of the female is moderately long, slender, perceptibly arcuated.

The specimens vary in the following characters:—

The larger specimens have a yellowish abdomen, brownish along the lateral margins only; the feet are yellowish; femora with a distinct brown band before the tip; tip of the tibiæ brown; wings with a yellowish tinge; stigma dark brown; a narrow brown cloud runs along the fifth longitudinal vein and the central cross-veins; a brown mark at the origin of the præfurca; the cloud at the tip of the wing is dark and very well marked.

A series of smaller specimens have a brownish abdomen, and brownish-tawny feet, except the coxæ and the basis of the femora, which are pale; the wings have a very pale tinge, and have no clouds, except the more or less faint apical cloud and the more or less infuscated stigma; the latter is sometimes quite pale.

Between these extremes, gradations in size and coloring occur, which compel the describer to unite all these forms into one species, until further observation brings more light upon the subject.

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Hab. United States; I have seen specimens from most of the Middle and Northern States; as far south as Georgia, west as Northern Illinois and the Upper Wisconsin River, and north as Maine (Mr. Packard). The specimen from Maine is one of the largest and most clouded upon the wings; a series of specimens from Delaware, Pennsylvania, and Maryland are small, with pale-colored wings.

13. L. luteipennis O. S. ♂ and ♀.—Fuscana, thorace lineâ mediâ fuscâ, pleuris canescentibus; alis fuscanis, nebulis obsoletis paucis obscuris; cellula submarginalis secunda posteriori primâ conspicue longior; longitudinalis septimæ apex incurvus.

Brownish, thorax with a brown line in the middle, pleuræ grayish; wings brownish with a few obsolete clouds; second submarginal cell considerably longer than the first posterior; seventh longitudinal vein incurved at the tip. Long. corp. 0.28—0.3.

Syn. *Limnophila luteipennis* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 236.

Head narrowed posteriorly, meeting a neck-like prolongation of the collare; front and vertex brownish-gray; rostrum and palpi brown; antennæ brown; first joint grayish above; basis of the third joint pale; joints of the flagellum rather short, becoming more slender towards the tip; verticils moderate. Thorax opaque, brownish above, gray on the sides; stripes nearly obsolete, but a brown longitudinal line in the middle always distinct. Halteres with a dusky knob. Feet tawny; tips of the femora very faintly, tips of the tibiæ and of the tarsi more distinctly infuscated. Abdomen yellowish-brown; venter paler; forceps brownish-yellow; ovipositor of moderate length, gently arcuated. Wings (Tab. II, fig. 10) tinged with brownish; there are faint brownish clouds at the origin of the præfurca, the inner end of the second submarginal cell, and on the marginal cross-vein (other clouds, on the cross-veins, at the inner end of the second posterior cell, and at the tips of the sixth and seventh longitudinal veins are almost obsolete, and generally invisible except in fresh specimens); veins brown; first longitudinal ferruginous; præfurca of moderate length, straight, except at the basis; petiole of the first submarginal cell about half the length of the præfurca, gently arcuated; marginal cross-vein about the middle of the distance between the inner end of the first submarginal cell and the tip of the first longitudinal vein; branches

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of the second longitudinal vein, especially the posterior one, arcuated; second submarginal cell longer than the first posterior, by a distance about equal to the length of the great cross-vein; second posterior cell short, in comparison to its petiole; seventh longitudinal vein conspicuously curved at the tip.

Hab. United States; common in the vicinity of Washington, D. C., from the earliest spring through the greatest part of the summer. Florida (in March); South Carolina; Massachusetts (Mr. Scudder).

The forceps of this species is represented on Tab. IV, fig. 25; the inner pair of appendages is ciliated.

I possess a specimen without petiolated (second) posterior cell on both wings. A stump sometimes occurs at the origin of the præfurca.

This species, together with *L. inornata* and *contempta*, form a separate group, distinguished by the structure of the antennæ, the shape of the head, which is narrowed behind; the neck-like prolongation of the collare, the venation (length of the second submarginal cell, arcuated course of the posterior branch of the second vein, seventh vein incurved at the tip), etc. All these species have very striking pits or impressions on the humeri, smooth, and as if horny, at the bottom; in front of the mesonotum, where the intermediate thoracic stripe reaches the collare, there are two small, closely approximated dots with a shining surface. These marks are either black or brown, and somewhat different in size in the different species. In *L. luteipennis* they are shining brown and very distinct. Similar pits on the humeri exist in many other species and in different sections (compare the Introduction, p. 29), but they are particularly well marked in the above-mentioned three species, and also in *L. fratria*.

14. L. contempta, n. sp. ♂ and ♀.—Fuscana, thorace concolore, vittis obsoletis, pleuris canescentibus; alis dilutissime fusco tinctis, unicoloribus; cellula submarginalis secunda posteriori primâ conspicue longior, longitudinalis septimæ apex incurvus.

Brownish, thorax of the same color, with obsolete stripes, pleuræ with a hoary bloom; wings tinged with pale brown, unicolorous; second submarginal cell considerably longer than the first posterior; seventh longitudinal vein incurved at the tip. Long. corp. 0.21—0.25.

Head grayish-brown, narrowed posteriorly; rostrum and palpi

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brown; antennæ brown, third joint pale at the basis; flagellum with subcylindrical joints, gradually becoming more slender; the ten joints before the tip are almost linear; verticils moderate. Thorax pale brownish, opaque; two brownish stripes above are hardly perceptible; pleuræ somewhat hoary. Halteres brownish, paler at the basis; feet pale tawny, tips of the tarsi brownish. Wings with a pale brownish tinge; stigma pale, seldom very faintly clouded; veins pale brown; the venation is similar to that of *L. luteipennis* and *inornata*. Abdomen brown; forceps yellowish.

Hab. Middle States; four specimens.

This species is smaller than *L. luteipennis* and *inornata;* of a more dull, brownish color; the veins of the wings are paler, etc. The impression on the humeri and the double dot in front of the mesonotum near the collare, are small, brownish, but distinct.

15. L. inornata, n. sp. ♂.—Fuscana, thorace griseo, metanoto medio infuscato; alis fuscano-flavescentibus, unicoloribus; cellula submarginalis secunda posteriori primâ conspicue longior; longitudinalis septimæ apex incurvus.

Brownish, thorax gray, metanotum brownish in the middle; wings tinged with brownish-yellow, unicolorous; second submarginal cell considerably longer than the first posterior; seventh longitudinal vein incurved at the tip. Long. corp. 0.3.

Head narrowed posteriorly, meeting a neck-like prolongation of the collare; rostrum and palpi brown; front and vertex gray, with black hairs; antennæ brown; basal joint grayish above; the third joint (the first of the flagellum) is a little longer than broad, cylindrical, attenuated at the basis, which is pale; the second joint of the flagellum is of a similar shape, very slightly shorter; the third is again somewhat shorter and more slender; the fourth and the following joints are linear, slender; verticils moderately long. Thorax bluish-gray on the pleuræ; mesonotum opaque, infuscated in the middle, in the location of the usual intermediate stripe; brownish-gray on the sides; collare and metathorax gray; halteres yellow. Abdomen brownish; venter paler; forceps reddish-yellow. Coxæ reddish-yellow, with a very slight gray bloom; yellowish at the base, becoming gradually brown towards the tip; tibiæ brownish-tawny; their tip brown; tarsi brownish. The length of the feet is comparatively greater than in *L. luteipennis.* Wings tinged with brownish-yellow; stigma pale; a

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very faint shade on the marginal cross-vein; otherwise the wing is unicolorous; auxiliary and first longitudinal veins reddish; the other veins brown; præfurca of moderate length, straight, except at the basis; petiole of the first submarginal cell about half the length of the præfurca, distinctly longer than the great cross-vein, gently arcuated; marginal cross-vein somewhat nearer to the inner end of the first submarginal cell than to the tip of the first longitudinal vein; branches of the second longitudinal vein, especially the posterior one, arcuated; second submarginal cell longer than the first posterior by a distance which is a little shorter than the great cross-vein; seventh longitudinal vein curved at the tip.

Hab. Massachusetts (Mr. Packard); a single male specimen.

This species is very like *L. luteipennis* in its general appearance, but is easily distinguished by its unicolorous wings; the thorax, although brownish above, has not the distinct brown line in the middle, which is very striking in *luteipennis;* the size is somewhat larger; the feet are considerably longer; in *L. luteipennis*, the fore tarsi of the male are about 0.22 long, in *L. inornata* about 0.32; the head of the latter species is of a purer gray, the pleuræ more bluish-gray; the second submarginal cell is a little shorter. The only specimen in my possession has the second posterior cell much longer than its petiole, and the great cross-vein very near the inner end of the discal cell. The impressions on the humeri and the double dot in front of the mesonotum are very distinctly marked, black, shining.

16. L. fratria, n. sp. ♂.—Fuscana, thorace cinereo, mesonoto pallide infuscato; antennarum flagelli articulis usque ad apicem brevibus; alis unicoloribus, subhyalinis, parum fuscano tinctis; cellula submarginalis secunda posteriori primâ modice longior.

Brownish, thorax yellowish-gray, mesonotum somewhat brownish; joints of the flagellum short to the very apex; wings unicolorous, subhyaline, very faintly tinged with brownish; second submarginal cell moderately longer than the first posterior. Long. corp. 0.3.

Head yellowish-gray, with blackish hairs; rostrum and palpi brown; antennæ pale brownish; first joint cylindrical; the second rather large, rounded; all the joints of the flagellum are not much longer than broad, rounded, gradually diminishing in size towards the tip (not at all linear, like those of *L. luteipennis* and *inor-*

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nata); verticils moderate. Thorax opaque, of a dull yellowish-gray; mesonotum yellowish-brown, grayish along the margins; stripes almost obsolete; pleuræ and metanotum hoary gray. Halteres yellow; knob somewhat infuscated. Feet yellowish-brown; the tips of the femora, of the tibiæ, and the tarsi darker; abdomen brownish; venter paler; forceps reddish-yellow. Wings unicolorous, with a very slight brownish tinge; the stigma but faintly clouded along the marginal cross-vein, which is very near the tip of the first longitudinal vein and rather distant from the inner end of the first submarginal cell; the petiole of the latter is of about the same length with the distance between the tip of the præfurca and the small cross-vein, and distinctly shorter than the great cross-vein; the second submarginal cell is therefore but little longer than the first posterior; præfurca nearly straight; seventh longitudinal vein very gently bisinuated.

Hab. Northern States; a single male specimen. (I have lost the label with the precise locality; the specimen is caught by me, and therefore either in the State of New York, or in New Hampshire.)

This species has a superficial resemblance to *L. inornata*, but is easily distinguished by the different structure of the antennæ, which might almost be called submoniliform; by the much shorter second submarginal cell, the proximity of the marginal cross-vein to the tip of the first longitudinal vein, and the much shorter feet and tarsi. The impressions on the humeri and the double dot in front of the mesonotum are black, and very distinct. The second posterior cell, in my only specimen, is shorter than its petiole, and the great cross-vein is a little beyond the middle of the discal cell.

17. L. brevifurca O. S. ♂.—Fuscana, thorace concolore, vittis obsoletis, alis dilutissime fusco tinctis, unicoloribus; cellula submarginalis secunda et posterior prima subæque longæ; posterior secunda perbrevis, petiolo longissimo.

Brownish, thorax of the same color, stripes obsolete; wings faintly tinged with brownish, unicolorous; second submarginal cell of almost the same length with the first posterior cell; second posterior cell very short, with a very long petiole. Long. corp. 0.27.

Syn. *Limnophila brevifurca* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 237.

Head brownish-gray, antennæ and palpi brown; joints near the

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basis of the flagellum not longer than broad, somewhat more elongated and slender towards the tip; verticils comparatively short. Thorax grayish-brown; an obsolete pale brown double stripe above; halteres pale at the basis; knob slightly infuscated; feet dark tawny, slightly infuscated at the tips of the femora and of the tarsi; coxæ and basis of the femora pale. Abdomen brownish; forceps paler. Wings faintly tinged with brownish; stigma very slightly darker; the second submarginal cell only a trifle longer than the first posterior; the second posterior is five or six times shorter than its petiole; the petiole of the first submarginal cell is distinctly shorter than the great cross-vein; marginal cross-vein very faint, about the middle of the distance between the tip of the first longitudinal vein and the inner end of the first submarginal cell; great cross-vein about the middle of the discal cell; seventh longitudinal vein straight, except the extreme tip, which is a little curved.

Hab. Washington, D. C., in April. I had eight male specimens when I first described this species. A number of them were swarming round a spring, in the woods. One of the specimens has a faint indication of an adventitious cross-vein in the middle of the first basal cell. The black pits on the humeri are well marked, but the double dot in the front of the mesonotum is obsolete.

18. L. ultima O. S. ♂ and ♀.—Grisea, thorace vittis quatuor fuscis; alis hyalinis, immaculatis; antennis fuscis, articulis flagelli basalibus quatuor coalescentibus, incrassatis; cellula submarginalis secunda primâ posteriori parum longior; vena longitudinalis septima recta.

Gray, thorax with four brown stripes; wings hyaline, immaculate; antennæ brown; the four basal joints of the flagellum are coalescent, incrassated; second submarginal cell but little longer than the first posterior; seventh longitudinal vein straight. Long. corp. 0.28—0.33.

Syn. *Limnophila ultima* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 238.

Head and thorax of a pure gray; antennæ and palpi brown; the antennæ, if bent backwards, would hardly reach the basis of the wings; the four first joints of the flagellum are short and almost coalescent, forming an elongated almost conical body, which is stouter than the remainder of the antenna; the following joints are elongated, subcylindrical; joints rather short. The thorax has four distinctly-marked brown stripes; the intermedi-

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ate ones are approximated. Halteres pale; the tip sometimes slightly infuscated; feet brownish-pubescent; spurs very short. Abdomen grayish-brown; forceps of the same color. Wings almost hyaline, distinctly broader in the female than in the male; stigma pale; first submarginal cell very short, being about equal in length to its petiole; the latter is gently arcuated, and very long (about four-fifths of the length of the præfurca); the second submarginal cell is very little longer than the first posterior; the small cross-vein is somewhat oblique; the discal cell is somewhat elongated, the cross-vein at its inner end is straight; the petiole of the second posterior cell is usually longer than this cell; the seventh longitudinal vein is perfectly straight. The marginal cross-vein is a little before the tip of the first longitudinal vein, a little beyond the middle of the stigma; but as the length of the first submarginal cell is somewhat variable, the marginal cross-vein, which is usually inserted a little before its inner end (that is, between the petiole and the first vein), is sometimes close by this end; in some specimens even, although rarely, a little beyond it (that is, between the anterior branch of the second vein and the first vein). The position of the great cross-vein is also very variable; a little beyond the inner end of the discal cell; or opposite this inner end, or even a little before it.

Hab. Washington, late in October; Maine (Packard); Canada; the northwestern regions of Hudson's Bay Territory, and also on the Yukon River in Aliaska (Kennicott).

The forceps of this species (Tab. IV, fig. 24) is distinguished by the great length of the basal pieces, and the comparative smallness of the horny appendages; this peculiarity is perceptible even in dry specimens. The ovipositor of the female is long, gently curved. The black humeral pits are distinctly perceptible; but there are no dots on the front part of the mesonotum.

19. L. aprilina O. S. ♂ and ♀.—Cinerascens, abdomine fusco, pedibus testaceis; alis ad costam six or septem-maculatis; venis transversis nebulosis; venulâ transversâ supernumerariâ in dimidio cellulæ basalis secundæ.

Grayish, abdomen brown; feet tawny; wings with six or seven brown spots near the costa; cross-veins clouded; a supernumerary cross-vein in the middle of the second basal cell. Long. corp. 0.25.

Syn. *Limnophila aprilina* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 235.

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Head cinereous; palpi black, short, especially the three last joints; antennæ brownish-tawny, basal joints darker; they are short in both sexes; when bent backwards, they would not reach beyond the root of the wings; joints of the flagellum subglobular or short-oval; those of the male are clothed on the under side with a dense pubescence; verticils distinct, moderately long. Thorax yellowish-gray, with indistinct brownish stripes, the intermediate double; halteres with a brown knob, sometimes pale; feet with a comparatively long pubescence, tawny, coxæ and basis of the femora paler; tips of the femora and extreme tips of the tarsi sometimes slightly infuscated. Abdomen brownish, margins of the segments darker. Wings with brown spots along the anterior margin: the first and smallest at the humeral cross-vein; the second between it and the origin of the præfurca; the third on the latter; the fourth at the tip of the auxiliary, the fifth at the tip of the first longitudinal vein; there are smaller spots or clouds at the tips of all the longitudinal veins, except the third; all the cross-veins and the inner end of the first submarginal cell are also clouded with brown; the first and fifth longitudinal veins, in the intervals of the brown spots, are usually yellow. The petiole of the first submarginal cell is rather long, longer than the great cross-vein; præfurca angular at its origin; sometimes provided with a stump of a vein; second submarginal cell distinctly longer than the first posterior; a supernumerary cross-vein in the middle of the second basal cell; the seventh longitudinal vein is gently sinuated in the middle and incurved at the tip.

Hab. Washington, D. C., in the spring; White Mountains, N.H.

The male forceps of this species (Tab. IV, fig. 23) is somewhat peculiar; the horny appendages are short, stout, obtuse, provided with a deep notch at the tip (l. c. fig. 23*a*). The ovipositor is very long and slender, gently arcuated. This species belongs to the genus *Ephelia* Schiner (compare p. 199), and is very much like an unnamed European species (perhaps *guttata* Macq. ?).

I possess a couple of specimens with comparatively shorter and broader wings, larger and darker spots; the horny appendages of their forceps (as I have noticed upon a fresh specimen), although also cleft, are less blunt at the tip and more elongated. I do not think that such specimens are specifically distinct.

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20. L. fuscovaria O. S. ♂ and ♀.—Cinerascens, abdomine fusco, pedibus pallidis; alis latis, dense fusco-punctatis; ad costam maculis majoribus fuscis; venulâ transversâ supernumerariâ in cellulâ submarginali primâ.

Grayish, abdomen brown, feet pale; wings broad, densely dotted with brown; larger brown spots along the costa; a supernumerary cross-vein in the first submarginal cell. Long. corp. 0.22.—0.3.

Syn. *Limnophila* (*Dicranophragma*) *fuscovaria* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 240.

Head gray, proboscis and palpi brown; antennæ pale, brownish towards the tip, with moderately long verticils; when bent backwards, the antennæ would hardly reach the basis of the wings; joints of the flagellum short, subglobular, becoming more elongated and slender towards the tip. Thorax grayish, with three narrow brown lines; the intermediate one, which is paler, begins in two black dots near the collare; pleuræ with two brown stripes; brown spots near and on the coxæ; halteres pale, with the tip slightly dusky; feet pale, pubescent; tip of the tarsi a little darker. Abdomen brown, paler on the margins of the segments; lateral margins darker; forceps pale; ovipositor ferruginous, long, slender, nearly straight. Wings very broad, variegated with numerous little brown dots; five larger, nearly square brown spots along the anterior margin; a supernumerary cross-vein connects both branches of the second vein, near the tip of the anterior one; petiole of the first submarginal cell not longer than the small cross-vein; the inner end of this cell rather broad, not pointed; præfurca somewhat angular near the basis; second posterior cell short, with a long petiole.

Hab. Washington, D. C., and farther north; as far as Quebec (Couper); not rare.

In the *Proc. Acad. Nat. Sci. Philad.* I have proposed for this species the subgeneric name of *Dicranophragma* (compare p. 199).

21. L. rufibasis O. S. ♂ and ♀.—Cinerea, halteribus pallidis, alis pallide fusco-flavescentibus, stigmate fusco; venulis centralibus et venâ longitudinali quintâ fusco-nebulosis; pedibus fuscis, femorum basi ferrugineâ.

Yellowish-gray, halteres pale, wings pale brownish-yellow, stigma brown; central cross-veins and fifth longitudinal vein clouded with brown; feet brown, basis of the femora ferruginous. Long. corp. 0.4—0.47.

Syn. *Limnophila* (*Prionolabis*) *rufibasis* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 239.

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Head yellowish-gray, palpi and antennæ brown; basis of the flagellum sometimes faintly rufescent; the antennæ in both sexes, if bent backwards, would not reach beyond the root of the wings; joints of the flagellum not much longer than broad, somewhat more elongated towards the tip, clothed with scattered hairs, but without verticils. The ground-color of the thorax above is a shining black, but it is almost completely hidden under a thick gray dust; stripes obsolete; pleuræ gray; halteres pale yellow. Coxæ gray; feet rather stout, brownish-tawny; femora somewhat reddish, except the tip, which is brown; tip of the tibiæ and the tarsi brown. Abdomen grayish-brown; horny parts of the genitals ferruginous and brown. Wings tinged with brownish-yellow, yellow at the root; stigma oblong, brown; central cross-veins, origin of the præfurca, and fifth longitudinal vein slightly clouded with brown; all the veins brown, except those near the costa, which are yellowish; the marginal cross-vein is very near the tip of the first longitudinal vein, although not quite close at it; it is about the middle of the anterior branch of the second longitudinal vein; the petiole of the first submarginal cell is of a variable length, but generally shorter than the great cross-vein (the figure, Tab. II, fig. 3, represents one of the shortest); the second submarginal cell is but slightly longer than the first posterior cell.

Hab. Washington, D. C.; New York; Massachusetts, etc. Found in woods, round stumps of trees.

The size of this species is somewhat variable; the wings are more yellowish in the larger specimens, and more grayish in the small ones. The male forceps (Tab. IV, fig. 27) has a pair of large, flat, horny appendages, serrated on the inside; and a second pair of shorter and broader appendages, independent of the first (fig. 27, *b*); the number of indentations of the large appendages varies according to the size of the specimen. The ovipositor of the female has long, rather straight, slender valves. I have proposed for this species the subgeneric name of *Prionolabis*, principally on account of the peculiar structure of the forceps (compare p. 197).

22. L. munda, n. sp. ♂ and ♀.—Nigra, thorace nitido, alis pallide fuscescentibus, stigmate fusco; pedibus lutescentibus, femorum tibiarumque apicibus fuscis.

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Black, thorax shining, wings with a pale brownish tinge; stigma brown; feet yellowish, tips of the femora and of the tibiæ brown. Long. corp. 0.25—0.3.

Head black, covered above with a brownish-gray bloom, and hence opaque; rostrum and palpi brown; antennæ brown, clothed with moderately long hairs, but without verticils; when bent backwards, they would reach but little beyond the root of the wings; the joints of the flagellum are short, somewhat obconical, becoming cylindrical towards the tip. Thorax black and shining above; pleuræ opaque; halteres yellowish, knob faintly brownish. Abdomen blackish-brown, the male forceps reddish-black. Coxæ yellowish; feet brownish-yellow, clothed with a rather long, black pubescence; femora and tibiæ infuscated at the tip; tarsi brown. Wings with a slight brownish tinge, yellowish near the root; veins brown, except those near the costa, which are yellowish; stigma brown; cross-veins faintly clouded with brownish; petiole of the first submarginal cell not longer than the great cross-vein; second submarginal cell but slightly longer than the first posterior.

Hab. White Mountains, N. H., in July; not rare. I have seven male and two female specimens.

The venation of this species is very like that of *L. rufibasis* (Tab. II, fig. 3). The forceps of the male is also somewhat like that of the latter species; the outer horny appendage is elongated and curved; the inner one stout and short (compare Tab. IV, fig. 27, forceps of *L. rufibasis*). The ovipositor of the female has long, slender, and rather straight valves. The relationship of the two species is evident, and *L. munda* may be also considered a *Prionolabis*.

23. L. montana, O. S. ♂ and ♀.—**Thorace cinereo; vittis quatuor fuscis; alis fusco-maculatis.**

Thorax gray with four brown stripes; wings spotted with brown. Long. corp. 0.35—0.4.

Syn. ***Limnophila (Dactylolabis) montana*** **O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 240.**

Head gray; rostrum and palpi brown; antennæ brown, four basal joints grayish; they do not reach much beyond the basis of the wings in both sexes; joints of the flagellum elliptical, clothed in the male with a dense, microscopic pubescence; verti-

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cils short, bristle-like. Thorax yellowish-gray above, with four brown stripes, the intermediate ones approximated; the lateral ones extend over the suture behind; pleuræ, scutellum, and metathorax grayish; halteres pale; feet very long and slender, dark tawny, tips of the femora and of the tibiæ darker; tarsi brown. Abdomen brownish-gray; forceps likewise; ovipositor ferruginous. Wings (Tab. II, fig. 7)[1] with four or five brown spots along the anterior margin; the third one is usually prolonged in the shape of a band, over the central cross-veins as far as the fifth longitudinal vein; the fifth spot, at the tip of the anterior branch of the second vein, is often wanting; the posterior end of the discal cell, and the inner end of the second posterior cell are likewise spotted with brown. Marginal cross-vein at the tip of the first longitudinal vein; anterior branch of the second vein arcuated, almost angular, near the basis; petiole of the first submarginal cell about the length of the great cross-vein; second submarginal cell only a trifle longer than the first posterior; discal cell elongated.

Hab. United States. It is a common species, and occurs in abundance especially in rocky localities, alighting upon the stone; I found it in this situation along the Hudson River Railroad, near New York, in abundance.

The spots vary in intensity as well as in size; those at the tip of the second vein and at the inner end of the second posterior cell are among the first to disappear; the other brown marks are apt to become very pale, almost obsolete. I possess a couple of specimens with an adventitious cross-vein in the first submarginal cell, opposite the marginal cross-vein. Another specimen has an adventitious cross-vein in the marginal cell, near the inner end of the first submarginal cell.

The forceps of the male of this species is very peculiar; instead of the usual horny appendages, it has a pair of elongated, digitiform, soft appendages, which do not overlap each other in repose (Tab. II, fig. 26 and 26*a*). The ovipositor has short, rather broad upper valves, abruptly tapering towards the tip. The structure of the forceps and of the antennæ, and the peculiar venation, have induced me to propose for this species the subgeneric name of *Dactylolabis* (compare above, p. 198).

[1] The figure shows only the veins and not the spots.

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24. L. cubitalis, n. sp. ♂ and ♀.—Cinerea, fuscescens, thorace fusco-quadrivittato, pedibus testaceis, alis immaculatis, stigmate concolore, petiolo cellulæ submarginalis primæ brevissimo; venulâ transversâ marginali ad apicem longitudinalis primæ sitâ.

Brownish-gray, thorax with four brown stripes, feet yellowish-tawny, wings immaculate, stigma colorless, petiole of the first submarginal cell very short; marginal cross-vein near the tip of the first longitudinal vein. Long. corp. 0.37—0.4.

Head gray, with short black hairs on the front; antennæ brownish, with short verticils; bent backwards, they would hardly reach the root of the wings. Thorax gray, somewhat brownish above, with four brown stripes; pleuræ of a lighter gray; halteres yellow; feet yellowish-tawny; tip of the tibiæ and tarsi brownish; basis of the coxæ grayish; the feet are rather stout and clothed with a somewhat conspicuous blackish pubescence. Abdomen grayish-brown, male forceps brownish-tawny; ovipositor ferruginous. Wings immaculate, with a pale yellowish tinge; veins pale brownish, except the first longitudinal and the auxiliary veins, which are yellowish: the stigma is hardly perceptible and entirely colorless. The petiole of the first submarginal cell is about the length of the small cross-vein; the anterior branch of the second longitudinal vein forms an almost right angle near its origin; the præfurca originates at an almost acute angle; the second submarginal cell is only slightly longer than the first posterior cell; the great cross-vein is near the inner end of the discal cell.

Hab. Virginia, Ohio; a male and a female specimens.

The forceps of the male, as far as can be judged from dry specimens, resembles that of *L. montana;* the venation also reminds of this species, especially the abrupt angle, formed by the anterior branch of the second vein at its origin, the position of the great cross-vein, etc. The ovipositor of the female is very peculiar, if that of the only female in my possession can be considered as normal: the upper valves are of moderate length and hardly arcuated at all; each one is connected on the under side with a membrane, which seems to be the prolongation of the valve. The dry specimen of course does not convey a correct idea of this structure. *L. cubitalis* is certainly related to *L. montana*, but I am uncertain whether it is to be considered as a *Dactylolabis.*

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II. *Four posterior cells.*

25. L. quadrata O. S. ♂ and ♀.—Cinerea, abdomine fuscescente, antennis palpisque fuscis; pedibus flavis, femorum, tibiarum, tarsorumque apicibus fuscis; alis immaculatis, stigmate pallido, cellulis posterioribus quatuor.

Yellowish-gray, abdomen brownish; antennæ and palpi brown; feet yellow; tips of the femora, of the tibiæ, and of the tarsi brown; wings immaculate, stigma pale; four posterior cells. Long. corp. 0.28—0.32.

Syn. *Limnophila quadrata* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 241.

Front and vertex yellowish-gray; palpi and antennæ brown; basal joints of the flagellum a little paler; antennæ of moderate length; verticils rather long. Thorax dark yellowish-gray; without distinct stripes; pleuræ slightly hoary; halteres pale; feet yellowish; coxæ and basis of the femora pale yellow; tips of the femora, of the tibiæ, and of the tarsi brown. Abdomen brownish; genitals yellow; ovipositor slender, long, slightly curved. Wings (Tab. II, fig. 9) faintly tinged with pale brownish; stigma colorless; veins brownish. The auxiliary vein ends a little before the inner end of the second submarginal cell; the subcostal cross-vein is close by its tip; the præfurca is long, straight, hardly arcuated at its origin; the petiole of the first submarginal cell is longer than the great cross-vein; the anterior branch of the second vein is oblique; the marginal cross-vein is at the inner end of the first submarginal cell, and somewhat oblique; the inner ends of the second submarginal, first posterior, and discal cells are nearly in one line; there are only four posterior cells; the great cross-vein is about the middle of the discal cell.

Hab. New York, Virginia, Maryland, etc. May, June.

The ground color of the head and thorax of this species is a shining black, but it is concealed under a gray dust or bloom, which renders it opaque.

Although this species has only four posterior cells, while *L. recondita, imbecilla, tenuipes*, etc. have five, there are abundant signs of a relationship between them. Except the different number of posterior cells, the venation is very much alike: a long, straight præfurca, forming a straight line with the posterior branch of the second vein; the oblique anterior branch of this vein, with the cross-vein near its origin; the inner ends of the second submarginal, the first posterior, and discal cells almost in

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one line; the small cross-vein gently arcuated; the end of the fifth vein strongly arcuated; the long verticils of the antennæ, the comparatively long feet, etc.

26. L. lenta O. S. ♂ and ♀.—Ochracea, fronte canescente; antennæ maris dense pubescentes; alæ immaculatæ; cellulis posterioribus quatuor.

Ochraceous, front grayish; antennæ of the male densely pubescent; wings immaculate; four posterior cells. Long. corp. 0.27—0.32.

Syn. *Limnophila lenta* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 241.

Ochraceous yellow; palpi and antennæ (except the basal joints of the latter), brownish; the antennæ of the male, if extended backwards, would reach a little beyond the root of the wings; the joints of the flagellum are elongated-elliptical, and each of them is clothed on both sides with a dense pubescence; the verticils are but little longer than this pubescence; in the female there is no conspicuous pubescence, and for this reason the verticils, although short, are more distinct. The front and vertex are grayish, the former even with a slight silvery reflection. Thorax ochraceous yellow, opaque above, without apparent stripes; halteres yellow; abdomen yellowish; feet pale yellow; tips of the tarsi, sometimes also the extreme tips of the tibiæ, infuscated. Wings subhyaline, with a faint yellowish tinge; veins yellowish or yellowish-brown; stigma pale, sometimes faintly infuscated at the cross-vein. Præfurca comparatively short (not much longer than the anterior branch of the second vein), strongly arcuated at its origin; petiole of the first submarginal cell about the length of the great cross-vein; the marginal cross-vein is usually between the inner end of the first submarginal cell and the tip of the first longitudinal vein; anterior branch of the second vein oblique; the inner ends of the second submarginal, the first posterior, and the discal cells are nearly in one line; only four posterior cells.

Hab. Virginia, Maryland; Illinois (Kennicott).

In the male forceps of this species the usual falciform appendages are less parallel and more diverging at the tip, when in repose, than in the other species. The shape of the first submarginal cell, the arcuated small cross-vein, etc. of this species may indicate a slight degree of relationship to *L. quadrata;* but the course of the præfurca, the structure of the antennæ, etc. are different.

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Gen. XXIX. ULOMORPHA.

Two submarginal cells; *four posterior cells;* discal cell closed; subcostal cross-vein near the tip of the auxiliary vein; *wings finely, but densely pubescent.* Eyes glabrous. Antennæ 16-jointed. Tibiæ with spurs at the tip; empodia distinct; ungues smooth.

Rostrum short, palpi of moderate length, last joint slender, but not much longer than the preceding; front moderately broad. Antennæ 16-jointed; those of the male, if bent backwards, would nearly reach the end of the thorax; those of the female are shorter; first joint cylindrical, comparatively short; the second short, as usual; the third oval, rather stout; the following joints slender, linear, with rather long verticils; those of the male with a dense pubescence on the under side of the flagellum. Collare moderately developed. Feet moderately long and stout; hairy. Spurs of the tibiæ small, but distinct. Wings clothed with a short, moderately dense, almost microscopic pubescence, which is evenly spread over the whole surface; it is not woolly, like the pubescence of *Erioptera*, and does not affect much the transparency of the wing. The subcostal cross-vein is near the tip of the auxiliary vein; the præfurca has its origin a little before the middle of the wing; this origin is slightly arcuated and sometimes with a stump of a vein; the marginal cross-vein is rather faint, and placed at a considerable distance before the tip of the first longitudinal vein; the first submarginal cell is almost as long as the second, its petiole being very short, and in some specimens obsolete; the inner ends of the second submarginal, the first posterior, and the discal cells are almost in one line; there are four posterior cells; the second has its inner end more or less attenuated; the portion of the fifth longitudinal vein, lying beyond the great cross-vein, is arcuated; the great cross-vein in most specimens has the appearance as if it was too short for the distance it has to cross over; it strains the two veins which it connects; the vein on the hind side of the discal cell shows this strain very plainly, appearing angular at the point of intersection with the cross-vein.

The structure of the antennæ and the venation (the presence of only four posterior cells notwithstanding) seems to point to a relationship with *Limnophila recondita* and its group; perhaps also to *L. quadrata*. The external resemblance of *Ulomorpha*

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to *Ula* is great, and has suggested the name of this new genus (*Ula*, and μορφή, form); still, they are easily distinguished by the position of the subcostal cross-vein, the structure of the ovipositor, which is more elongated and straight in the present genus than in *Ula;* by the glabrous eyes of *Ulomorpha*, its shorter palpi, etc. At present, only one species is known; but it seems possible that *Limnophila pilicornis* Zett. *Dipt. Scand.* X, p. 3885, No. 61, is an *Ulomorpha*.

Description of the species.

1. U. pilosella O. S. ♂ and ♀.—Pallide fusca, antennis, palpis, et fronte fuscis; abdomine et halterum capitulo infuscatis; alis immaculatis, pallide fusco tinctis.

Pale brown, antennæ, palpi, and front brown; abdomen and knob of the halteres brownish; wings immaculate, tinged with brown. Long. corp. 0.3—0.35.

Syn. *Limnophila pilosella* O. Sacken, Proc. Ac. Nat. Sc. Phila. 1859, p. 242.

Rostrum yellowish, palpi brown; front and vertex infuscated in the middle, grayish on the sides, clothed with black hairs; antennæ brownish. Thorax pale brownish, without any apparent stripes above; pleuræ yellowish; halteres pale at the base; the knob infuscated; feet tawny, tips of the femora faintly infuscated; tips of the tarsi brown. Abdomen brown, venter paler; valves of the ovipositor long, slender, pointed, nearly straight. Wings tinged with brownish; stigma colorless.

Hab. Trenton Falls, N. Y.; Sharon Springs, N. Y.

Gen. XXX. TRICHOCERA.

Two submarginal cells; five posterior cells; a discal cell; the subcostal cross-vein at a considerable distance from the tip of the auxiliary vein (about equal to the breadth of the wing), although posterior to the origin of the second vein; *seventh longitudinal vein very short, strongly arcuated, abruptly incurved towards the anal angle* (Tab. II, fig. 13). Tibiæ with spurs at the tip; empodia distinct. *Eyes pubescent; distinct ocelli on the sides of the frontal tubercle*; antennæ setaceous, 16-jointed, but joints very indistinct. Male forceps with elongated, fleshy, digitiform appendages; ovipositor of the female reversed, that is, with the convex side above and the concave below.

Rostrum and proboscis short; palpi somewhat prolonged, the last joint elongated, attenuated in the middle, and thus showing

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the appearance of two joints. Eyes large, very convex, pubescent, separated above by a very broad front; two ocelli are distinctly visible on each side of a gibbosity immediately above the antennæ; the latter are considerably longer than the head and the thorax taken together, setaceous, very slender, finely pubescent; first and second joints very short; the third and the following subcylindrical, elongated, gradually becoming more slender; in dry specimens the joints of the flagellum, except the basal ones, are indistinct; in living specimens, under the microscope, the antennæ appear 16-jointed.[1] The thoracic suture is well marked; the interval between it and the scutellum shows a smooth depression, and no trace of the longitudinal furrow usually visible there. Feet slender, with an almost imperceptible pubescence. Wings (Tab. II, fig. 13, wing of *T. bimacula* Walk.) rather broad; the tip of the auxiliary vein is nearly opposite the tip of the fifth longitudinal vein; the subcostal cross-vein is at a distance from the tip of the auxiliary vein, which is nearly equal to the breadth of the wing; the tip of the first longitudinal vein is nearly opposite the posterior branch of the first fork of the fourth vein; the second longitudinal vein originates before the middle of the length of the wing; the subcostal cross-vein is at a distance beyond it, which is a little longer than the great cross-vein; the præfurca, gently arcuated at its basis, is comparatively long, but little shorter than the second submarginal cell; the first submarginal cell is shorter than the second, its petiole being about equal in length to the great cross-vein; the marginal cross-vein is a little beyond the inner end of the first submarginal cell; the second submarginal and first posterior cells are of equal length; the discal cell is somewhat elongated, projecting inside of the small cross-vein; the great cross-vein is opposite the further end of the discal cell; the fifth longitudinal vein is angularly broken at the great cross-vein; sixth vein straight; seventh very short, arcuated, incurved to the anal angle. The forceps of the male consists of the usual two subcylindrical basal pieces, each of which, instead of any horny organs, bears a movable, elongated, cylindrical, fleshy appendage; these appendages, when

[1] This number has been for the first time correctly stated by Mr. Westwood in the explanation to Tab. XXVI, fig. 8, of Walker's *Ins. Brit. Dipt.* Vol. III; in former works it was given incorrectly or not mentioned at all.

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at rest, are porrected, slightly inclined towards each other, leaving a considerable open space between them. The ovipositor of the female is distinguished from all the ovipositors of the *Tipulidæ* by being reversed; that is, having the convex side of the arcuated valves above and the concave side below.[1]

The *Trichoceræ* appear in swarms during sunny autumn and winter days; their larvæ live in decaying vegetable matters, and have been described and figured by Perris (*Ann. Soc. Entom. de France*, 2e sér. Vol. V, 1847, page 37; Tab. I, No. III).

The pubescence of the eyes is a character which, so far as observed, belongs among the *Tipulidæ*, to the *Amalopina* alone. *Trichocera* is the only exception. Further, this genus, and perhaps also *Pedicia*, seem to be the only ones among the *Tipulidæ*, which have ocelli. *Trichocera* is, moreover, abundantly distinguished by the position of the great cross-vein, at the further end of the discal cell, the course of the seventh longitudinal vein, the flat depression between the thoracic suture and the scutellum, and the structure of the ovipositor. Nevertheless, its position among the *Limnophilina* has nothing unnatural. The structure of the forceps alone would be sufficient to separate *Trichocera* from the *Amalopina*, which always have a strong, branched horny forceps. *Trichocera* is represented by five species in Europe. Only one species (*T. ocellata* Walk. *Dipt. Saunders.* p. 433; East Indies) from any other part of the world, besides America, has been described. Two fossil species have been found by Mr. Loew, in the Prussian amber (Loew, *Bernst. u. Bernsteinfauna*, p. 37); they are very like the European species, and show only slight differences in the venation.

The name is derived from θρίξ, hair, and κέρας, horn.

Four species of *Trichocera*, peculiar to North America, have been described (*T. bimacula* Walker, *gracilis*, Walker, *brumalis* Fitch, and *scutellata* Say[2]). Moreover, two European species have been mentioned as occurring in North America: *T. maculipennis* Meig. by Stæger, and *T. regelationis* Lin. by O. Fabricius.

[1] It is very singular that this striking peculiarity has been entirely overlooked by previous authors, even by those who, like Walker and others, pretend to describe the ovipositor. That the pubescence of the eyes has not been noticed, is easier to explain; likewise the presence of ocelli. Meigen alone saw the latter (Meigen, Vol. I, p. 211), but his statement has been overlooked since.

[2] The descriptions of these species are reproduced in the Appendix I.

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The small number of *Trichoceræ* which I have before me for comparison, may be grouped thus:—

I. Wings with two brown clouds, one near the origin of the præfurca, the other on the small cross-vein.

1. Knob of the halteres not infuscated; thorax with a yellowish-gray bloom above, and with rather distinct brown stripes; the petiole of the first submarginal cell is about three times the length of the distance between the inner end of this cell and the marginal cross-vein (Tab. II, fig. 13); the latter not perceptibly clouded with brown; wings comparatively narrow; long. corp. about 0.25. Very common everywhere . . . . . **bimaculata** *Walk.*?

2. Knob of the halteres distinctly infuscated; wings much broader than in the preceding species; the thorax is of a paler yellowish-gray and the stripes less distinct, although visible; the petiole of the first submarginal cell is but little longer than the interval between the inner end of this cell and the marginal cross-vein; the latter with a distinct brown cloud; long. corp. 0.25. A single female specimen, from Canada . . . **maculipennis** *Meig.*, or nov. sp.?

II. Wings with a single faint brown cloud on the small cross-vein.

3. The petiole of the first submarginal cell is about twice the length of the distance between the inner end of this cell and the marginal cross-vein; the wings are rather broad, almost hyaline; the thorax brownish, with a yellowish-gray bloom; stripes almost obsolete, hardly visible; knob of the halteres brown; the great cross-vein is a little before the posterior end of the discal cell; a single male specimen; long. corp. 0.18 . . . . Spec. nova?

III. Wings unicolorous.

4. Thorax brownish, with a yellowish-gray bloom, and with tolerably well marked brownish stripes; wings with a very faint yellowish tinge; the petiole of the first submarginal cell is equal in length to the distance between the inner end of this cell and the marginal cross-vein; the great cross-vein is at the posterior end of the discal cell, or very near this end; halteres with brownish knobs; long. corp. 0.21 . . . . . Spec. nova?

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5. Thorax of a purer gray than any of the preceding species; the two brown stripes are very faintly marked on the front part of the mesonotum only; wings clearer hyaline than in the preceding species; venation as in the preceding species; stigma very faintly infuscated; halteres with a brown knob; long. corp. about 0.2 . . **brumalis** *Fitch?*

The small materials in my possession do not allow me to attempt the description of the apparently new species. At the same time, the existing descriptions are too incomplete or too incorrect to admit of a positive identification. The description of *T. bimacula* Walker, for instance, is such as to render it very doubtful whether the species given above under that name is really Walker's species; the character, "abdomen with alternate tawny and brown rings," is not visible in my specimens.

A large number of specimens and a comparison with the European species will be necessary to those who will attempt the description of the North American species.

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SECTION V. ANISOMERINA.

Two submarginal cells (only one in *Cladolipes*); three, four, or five posterior cells; discal cell closed or open; subcostal cross-vein near the tip of the auxiliary vein, posterior to the origin of the second vein. Eyes glabrous. *The normal number of the antennal joints is six in the male and not more than ten in the female.* Tibiæ with spurs at the tip; empodia distinct; ungues generally smooth.

This section is easily distinguished by the aberrant number of antennal joints. In other respects, the most numerous genus of the family, *Eriocera* is exceedingly like the *Limnophilina* in its venation and the structure of its male forceps. The species of *Eriocera* and *Penthoptera*, have either five or four posterior cells, a character which, in this section, seems to have no higher importance than for the distinction of species. In *Anisomera* and *Cladolipes* the posterior cells are reduced to the unusual number of three; to which, in the latter genus, is added the disappearance of the first submarginal cell.

These differences in the venation notwithstanding, strong links of affinity unite these genera. The male has six-jointed antennæ, which, in some species, are much longer than those of the female, sometimes more than twice the length of the body; while in otherwise closely allied species the antennæ of both sexes are short and nearly of the same length. These modifications in the relative length of the antennæ occur in the three principal genera of this section, *Anisomera*, *Penthoptera*, and *Eriocera*. The female antennæ are short, and the structure of their apical portion is such as to leave the number of the joints, composing it, somewhat uncertain, especially in dry specimens. On living female specimens of *Eriocera* and *Penthoptera* I have distinctly counted ten joints.

The ovipositor of *Anisomera* has a peculiar structure; the valves are short and blunt, the upper ones much shorter than the

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lower ones. The same structure occurs in *Eriocera longicornis*. The other *Erioceræ*, as well as *Penthoptera*, have the ovipositor of the usual structure.

Eriocera and some forms related to it are abundantly represented in the warmer regions of Asia, Africa, and America; the genera *Pterocosmus* Walk., *Physecrania* Bigot, *Oligomera* Doleschall, and *Evanioptera* Guérin, are either synonymous with *Eriocera* or related to it. The other genera of this section have not been discovered yet outside of the temperate regions of Europe and North America.

The genus *Bertea* Rondani (*Atti d. Sc. Natur. di Milano*, II, p. 56, with figures), for which this author establishes a separate family, *Berteidæ* (comp. above, p. 12), is based upon a single specimen found under beech leaves. Its wings are abortive, very short, without any apparent venation; it has a tubercle on the front with two or three indistinct ocelli (the author himself, however, was not certain about the correctness of this statement); the antennæ are twelve-jointed, the third joint being cylindrical and about twice the length of the first and second joints taken together, while the other joints of the flagellum are rounded. If I mention this genus here, it is because the tubercle on the front and the length of the third antennal joint may indicate a relationship of *Bertea* to the *Anisomerina*; however, the above-quoted description does not furnish the necessary data for any positive conclusion.

Gen. XXXI. ANISOMERA.

Two submarginal cells; *three posterior cells*; discal cell open; subcostal cross-vein near the tip of the auxiliary vein (Tab. II, fig. 12). Tibiæ with spurs at the tip; empodia distinct. Eyes glabrous, front with a large gibbosity behind the antennæ; the latter 6-jointed, sometimes with a rudimental seventh joint at the tip, in the male; in the female they have the same number of joints, but the sixth has often the appearance of being subdivided in three, four, or five joints. Ovipositor of the female short, obtuse; upper valves shorter than the lower ones.

Head large and broad; rostrum and palpi short; the latter (according to Walker and Schiner) have joints of an equal size; front very broad, frontal gibbosity bituberculate; eyes very remote on the upper as well as on the under side of the head. Antennæ six-jointed in the male, the third joint being the longest;

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they are filiform or subfiliform, and vary in length in different species; in some, they are longer than the body, in others about half the length of the body; again in others shorter than the thorax. The antennæ of the female are always shorter than those of the male, apparently likewise 6-jointed; the last joint, however, shows transverse divisions, which have often the appearance of three, four, or five additional joints.[1] The antennæ of both sexes are pubescent, but without verticillate hairs. The head is closely applied to the short collare, which receives it in a kind of excavation; this character, distinctly apparent in the only North American species, is also common to all the European ones (Loew, l. c.). Thoracic suture deeply marked. Feet more or less long and stout, spurs of the tibiæ and empodia distinct; ungues usually smooth. (The European *A. longipes* has, according to Loew, a distinct and rather strong tooth on the under side of the ungues of the hindmost feet; this is probably the angular projection of the stout basal portion of the ungues, which occurs also in *Eriocera* and looks like a tooth, although it is quite distinct from the teeth on the ungues of the *Limnobina*.) The wings of the North American *A. megacera* are much shorter and narrower in the male than in the female; but this does not seem to be the case with the European species (Mr. Loew often mentions the wings of the female as being like those of the male). The venation of *A. megacera* (Tab. II, fig. 12) shows the following characters: the auxiliary vein ends in the costa nearly oppo-

[1] Hence the disagreement between authors as to the number of the antennal joints of the female. Westwood (in the explanation of Tab. XXVI of Walker's *Ins. Brit. Diptera*) calls the antennæ of a female *Anisomera* 10-jointed; this would be in conformity with the antennæ of the females of *Eriocera* and *Penthoptera*, upon which I have counted ten joints on living specimens. The only fresh female specimen of *A. megacera*, which I have had the opportunity to examine, had several subdivisions of the last joint, but they were not sufficiently distinct to be counted; a dry specimen shows three such subdivisions; a dry European specimen which I have before me (perhaps *Peronecera*?), shows four or five. Mr. Loew, in his article, Ueber die bisher beschriebenen europäischen *Anisomera*-Arten (in the *Zeitschrift für die gesammten Naturwissenschaften*, Nov. 1865), calls the antennæ six-jointed in both sexes, sometimes with a more or less developed seventh joint; the latter species, according to this author, belong to the number of those which have short antennæ in the male sex. I will have frequent opportunities to quote Mr. Loew's article, and give therefore its title in full.

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site the inner end of the second submarginal cell (a little anterior to it); the subcostal cross-vein is very near its tip; the tip of the first longitudinal vein is nearly opposite the tip of the posterior branch of the fourth longitudinal vein; the marginal cross-vein is a very short distance anterior to this tip; the second longitudinal vein originates about the middle of the length of the wing, or a little before it (in the female); præfurca long, almost equal in length to the second submarginal cell, or somewhat longer (in the female); its course is straight; the fork of the second vein is very short, as in *Goniomyia*, and hence, the first submarginal cell is triangular; the petiole of this cell is many times longer than the cell, and has the marginal cross-vein about its middle; the second submarginal cell, which is somewhat arcuated in shape, is longer than the first posterior; the inner ends of the three posterior cells are often nearly in a line; sometimes, however, the inner end of the second posterior cell projects inside of this line; the fourth vein is in a straight line with its posterior branch; the anterior branch (inclosing the second posterior cell) is angular at the inner end; as neither of the branches is forked, there can be only three posterior cells and no discal cell; the three last longitudinal veins are nearly straight. The European species have, in the main, an exactly similar venation (compare the figures in Meigen, Vol. I, Tab. VII, and Walker, *Ins. Brit. Dipt.* Tab. XXVI, fig. 9). The species differ, however, in one point only: the length of the first submarginal cell; in some species, this cell is longer than its petiole, and in such cases the marginal cross-vein connects the first longitudinal vein with the anterior branch of the second, and not with the petiole. It seems that among the European species a short first submarginal cell and a marginal cross-vein inserted about the middle of its petiole, are characters usually connected with short antennæ in the male (compare Loew, l. c. p. 414); but the American *A. megacera* proves that this is not an invariable rule; although this species has a very short first submarginal cell, the antennæ of the male are much longer than the body.

The male forceps does not seem to have anything unusual in its structure; it consists of the ordinary basal pieces, with horny appendages; I have not had the opportunity to observe it upon living specimens. The ovipositor of the female is remarkable for

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the shortness of its valves; the upper pair is always shorter than the rather obtuse lower pair.

Anisomera is, among all the *Tipulidæ*, the only genus which has three posterior cells (and this venation is still more reduced in the genus *Cladolipes* Loew, which has only one submarginal cell). Nevertheless, the relationship of *Anisomera* to *Eriocera* (with its four or five posterior cells) cannot be called in doubt. The anomalous structure of the antennæ, the great length which they frequently attain in the male, the structure of the head and of the feet prove this relationship.

Hitherto I have discovered only one North American species of *Anisomera;* it is distinguished by the considerable length of its antennæ. Mr. Loew enumerates nine European species. One of them, *A. fuscipennis*, has been proposed by Mr. Curtis (*Brit. Entom.* 539; 1836), for the type of a separate genus, *Peronecera* (from περόνη, a button, and κέρας, horn, in allusion to the rudimental joint at the tip of the antennæ). This genus, also adopted by Loew, is based solely upon the number of antennal joints, which is *seven* in the male and *nine* in the female (this is Mr. Loew's statement; Mr. Curtis says *seven* (♂) and eight joints (♀)). The antennæ are short in both sexes, and not much longer in the male than in the female. According to Mr. Loew, *Peronecera* is closely related to those *Anisomeræ* with short male antennæ, which have a rudimental seventh joint. Such species have but a limited power of flying, as they seem to jump rather than to fly (Loew, l. c. p. 414). Mr. Loew mentions but a single species of *Peronecera;* Mr. Curtis, besides this same species, describes another one, *P. lucidipennis*, n. sp.

The species of *Anisomera* occur along the banks of streams; the larvæ (according to Van Roser (*Verz. Würt. Dipt.* p. 262) live in the sand of these banks (or perhaps in the vegetable detritus found there?).

The first species belonging to this genus was described by Latreille, in 1809 (*Genera Crust. et Ins.* IV, p. 260), under the generic name of *Hexatoma*.

Meigen, in 1818, rather arbitrarily changed the name of *Hexatoma* in *Nematocera*, on the ground that he had been compelled to alter the name of his own genus *Heptatoma* (Tabanidæ) in *Hexatoma* (Meig. Vol. I, p. 209). At the same time he adopted

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the genus *Anisomera*, of which he had received a drawing and description; the latter by Wiedemann.

In 1830 Meigen (Vol. VI, p. 291) recognized the identity of *Nematocera* and *Anisomera*, and dropped the former name.

Curtis (*Brit. Entom.* 589), in 1836, introduced the genus *Peronecera*, already mentioned above.

A detailed account of all the European species and the history of each, has been given by Mr. Loew in his often quoted article. The coloring of the European species seems to be rather uniform: blackish-gray, with darker stripes on the thorax; the only known American species agrees in this respect with them.

The name *Anisomera* is derived from ἄνισος, unequal, and μέρος, part, in allusion to the structure of the antennæ.

Description of the species.

1. A. megacera O. S. ♂ and ♀.—Obscure cinerea, nigrescens; thorace vittis tribus obscuris; antennæ maris corpore toto longiores; feminæ thorace breviores; venula transversa marginalis pedunculo cellulæ submarginalis primæ inserta.

Dark gray, blackish; thorax with three dark stripes; antennæ of the male longer than the whole body; those of the female shorter than the thorax; marginal cross-vein inserted on the petiole of the first submarginal cell. Long. corp. 0.27—0.3.

Syn. *Anisomera megacera* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 242.

Head dark gray, almost blackish in the middle; palpi and antennæ black; the latter, in the male, nearly once and a half the length of the body, finely pubescent; basal joints short; flagellum filiform; first joint very long (if bent backwards, it would reach the basis of the abdomen); the second and third also elongated, although somewhat shorter than the first; the remaining portion of the antennæ is a little shorter than the third joint of the flagellum. The antennæ of the female are short (bent backwards, they would hardly reach the root of the wings); the third joint is the longest; the sixth is very short, almost rudimental. Thorax dark gray, with a yellowish reflection; a brownish, cuneiform intermediate stripe, with a faint pale longitudinal line in the middle; the two lateral stripes are much abbreviated in front, and extended beyond the suture behind; a soft, short, hardly perceptible yellowish pubescence between the stripes; halteres more or less dusky; feet brownish, femora somewhat

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darker at the tip. Abdomen blackish; male forceps likewise. Wings with a slight grayish tinge; the marginal cross-vein is inserted a little before the middle of the petiole of the first submarginal cell.

Hab. Washington, D. C.; Maryland; early in the spring, near running water. I have had six males and three females.

Gen. XXXII. CLADOLIPES.[1]

A single submarginal cell; three posterior cells; no discal cell; subcostal cross-vein near the tip of the auxiliary vein. Tibiæ with spurs at the tip; empodia distinct; ungues smooth. Eyes glabrous; front convex, but without projecting gibbosity. Antennæ (in the female) 8-jointed. Ovipositor very long, narrow, pointed, somewhat arcuated towards the tip.

This genus (which I have not seen) has been established by Mr. Loew, in 1865 (in the article quoted above on page 240, in the foot-note), upon the female of a species from Greece. It differs from *Anisomera* in the absence of the fork of the second vein, and, consequently, the presence of only one submarginal cell. The antennæ of the female resemble those of *Anisomera* in being without verticillate hairs. Although, in an artificial arrangement, *Cladolipes* would have to be placed among the *Tipulidæ* with a single submarginal cell, it is evidently related to *Anisomera*.

Cladolipes simplex Loew, the species alluded to, is of the size of an ordinary *Anisomera* and altogether blackish, including the wings.

Gen. XXXIII. ERIOCERA.

Two submarginal cells; four, sometimes five posterior cells; a discal cell; the subcostal cross-vein a short distance back of the tip of the auxiliary vein; the first submarginal cell shorter than the second. Tibiæ with spurs at the tip; empodia distinct. Front with a more or less striking gibbosity behind the antennæ; antennæ 6-jointed in the male, sometimes enormously prolonged, sometimes not much longer than those of the female; antennæ of the female ten-jointed, comparatively short. Male forceps with a pair of elongated, subcylindrical basal pieces, each bearing two appendages, one of which is claw-shaped, horny; the other coriaceous, blunt (Tab. IV, fig. 29, forceps of *E. spinosa*; fig. 28, that of *E. fuliginosa*).

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[1] From κλάδος, a branch, and λείπω, I omit.

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Head rather large; front broad, with a more or less conspicuous, often bituberculate gibbosity behind the basis of the antennæ; epistoma short, transverse, often concealed under the basal joints of the antennæ; lips of the proboscis large, projecting; the palpi rather long, often as long as the head; the two first joints are generally prolonged, and the fourth is still longer; the third being usually the shortest; however, these proportions vary somewhat in different species. *E. wilsonii* has comparatively short palpi; the first two joints seem to be prolonged, but the fourth is short. Eyes glabrous, remote above and below. The antennæ of the male are of two kinds: either very long, and much longer than in the female; or short, and not perceptibly longer than in the female. The long ones again, vary in their length, the nature of their pubescence, and their structure; those of *E. spinosa* and *E. longicornis* are the longest, being more than twice the length of the body; they are similar in structure; the scapus consists of a subcylindrical, rather stout basal joint, and a very short, annuliform second joint; the flagellum is filiform, gradually attenuated towards the end; the first joint is about as long as the thorax; the second is a little longer than the first; the third is about equal to the second and third taken together, and the fourth is still longer than the third; the joints of the flagellum are beset on their under side, at rather regular intervals, with strong, spine-like bristles, which gradually become softer and more hair-like towards the end of the antenna; the upper side of the flagellum is glabrous. The antennæ of *E. wilsonii* are about once and a half the length of the body; the first joint of the flagellum is a little longer than the second; the whole flagellum on both sides is evenly and delicately pubescent, the pubescence being intermixed, towards the end of the antenna, with some scattered longer hairs. The male antennæ of the short kind, if bent backwards, would not reach beyond the roots of the wings (this is the case with *E. fuliginosa*); they are rather coarsely hairy, but without verticils; the scapus has the ordinary structure; the first joint of the flagellum is the longest. The antennæ of all the female *Erioceræ* are very much like those of the latter kind of males, and not perceptibly shorter; a subcylindrical basal joint; a short second one; the third joint (first joint of the flagellum) is the longest. In dry specimens four joints of the flagellum can be more or less distinctly counted; beyond this, the female antenna

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is usually wrinkled and shrunken; but in fresh specimens I have counted (in *E. longicornis* Walk.) eight joints of the flagellum, which would make the female antenna ten-jointed.

The head is, as in *Anisomera*, closely applied to the collare, which is narrow. The thoracic suture is well marked. The feet are long and usually rather stout; *E. longicornis* has a remarkable character in the great shortness of the two anterior pairs of femora, which are not much over half the length of the posterior ones; this character is much less striking in the other species; it is to be remarked, however, that the two anterior pairs of femora seem to be rather inconstant in their length, in *E. longicornis*, as well as in *E. spinosa*. In *E. spinosa* and *E. longicornis* the last joint of the tarsi of the male is excised at its basis on the under side, and also hollowed out and hairy in the middle of its under side; this character is not perceptible in *E. wilsonii*. Some of the species (for instance *E. spinosa*) have a small projecting tooth at the extreme basis of the ungues, on the under side; but it is difficult to perceive among the hairs which clothe the tarsi.

The venation of the wings is exactly like that of some *Limnophilæ*. The auxiliary vein, the tip of which is more or less opposite the inner end of the second submarginal cell, has the subcostal cross-vein a short distance back from its tip. The marginal cross-vein is a short distance anterior to the tip of the first longitudinal vein; its relative position to the inner end of the first submarginal cell depends on the length of the latter; sometimes the cross-vein is inserted at this very inner end, sometimes beyond this point. Præfurca long, straight, arcuated at its basis only. The inner end of the first submarginal cell, in all the species which I have before me, is pointed, its petiole is either a little shorter than the great cross-vein, or much longer; the second submarginal cell likewise varies in length, its inner end (which is also pointed) projects more or less inside of the small cross-vein towards the basis of the wing. It follows from this that the first posterior cell is, in most cases, shorter than the second submarginal; in some cases they are subequal. The discal cell is more or less square; the section of the fifth longitudinal vein lying beyond the great cross-vein is generally, but not always, at an angle with the anterior portion of the vein; the sixth and seventh veins are straight. Three North American species have

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four posterior cells (*E. longicornis*, *wilsonii*, and *fuliginosa*); one species has five (*E. spinosa*)

The forceps of the male is not unlike that of the typical *Limnophilæ*, that is, it consists of two elongated, subcylindrical basal pieces with a horny unguiform and an obtuse, apparently coriaceous appendage, attached to each (compare, for the details, the description of the figures, Tab. IV, figs. 28 and 29). The ovipositor of the female consists of two elongated, pointed, rather narrow, nearly straight or gently curved upper valves, and a pair of lower ones, which are shorter. But the female of *E. longicornis* (provided what I have before me is really the female of this species) has the ovipositor of an entirely different structure, and exactly similar to that of *Anisomera*. It is short, blunt, and somewhat directed upwards (at least in dry specimens); its upper valves are shorter than the lower ones. I have not seen the female of *E. wilsonii*.

The relationship between *Eriocera* and *Anisomera* appears: in the abnormal structure of the antennæ, their frequent extraordinary length in the male, and aberrant structure in the female; the peculiar shape of the collare; the very unusual structure of the ovipositor of the latter genus, which structure occasionally reappears in *Eriocera*.

Every one of the four North American *Erioceræ* at present known shows peculiarities of structure which, in some of the other sections of the *Tipulidæ*, would have been sufficient for a generic separation; here, these same characters do not seem to have any other but a specific value. In order to compare the principal of these characters, we may tabulate them as follows:—

A. Antennæ of the male very long and much longer than those of the female.

1. Antennæ of the male glabrous on the upper side, and with a series of bristles, inserted at regular intervals on the under side (ARRHENICA O. S., olim).

a. Five posterior cells . . . . . E. spinosa.

b. Four posterior cells . . . . . E. longicornis.

2. Antennæ of the male finely pubescent on both sides.

a. Four posterior cells . . . . . E. wilsonii.

B. Antennæ short in both sexes.

a. Four posterior cells . . . . . E. fuliginosa.

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The two species of the first group (*E. spinosa* and *longicornis*) are most closely allied, which is proved by the analogous structure of their antennæ, and the resemblance of the coloring and of the whole bearing of the insects. Nevertheless, one has four and the other five posterior cells, which shows the secondary importance of this character in the present group. The two other species have four posterior cells.

No true *Eriocera* has been discovered in Europe yet (the closely allied genus *Penthoptera*, however, occurs both in Europe and in North America). But in the warmer latitudes of Asia, Africa, and America, *Eriocera* seems to be one of the most abundantly represented genera of *Tipulidæ brevipalpi*. I was struck with this in looking over the principal collections in Europe; some of the species, however, may be more related to *Penthoptera*. The following historical account of the genus *Eriocera* contains the list of species described by former authors, as far as I have been able to ascertain their relationship.

Wiedemann's *Limnobia basilaris*, *acrostacta*, and probably *mesopyrrha*, all from Java; *L. caminaria*, *erythrocephala*, and *nigra*, from Brazil, are *Erioceræ*.

The genus *Eriocera* (from ἔριον, wool, and κέρας, horn) was first introduced by Macquart in the *Diptères Exotiques*, etc. Vol. I, p. 74, Tab. X, fig. 2. This author was struck by the abnormal number of antennal joints of *Limnobia nigra* Wied., and founded the genus principally upon this character; but that he did not realize the true character of the genus he was establishing, results from the fact, that in the same volume (l. c. p. 67) he describes *Eriocera erythrocephala* Wied. and *Eriocera acrostacta* Wied. as *Cylindrotomæ*, upon the ground of the cylindrical shape of the joints of the flagellum; the abnormal number of antennal joints he explains away in both cases by the supposition that the ends were broken off. Moreover, he had another *Eriocera*, likewise with four posterior cells (*E. bituberculata*, from Brazil), but the antennæ of the specimen were entirely broken off; this species he placed, on account of its four posterior cells, in the genus *Limnobia* (l. c. p. 72). He had done the same in his earlier work, with his *Limnobia diana*, from Bengal (*Hist. Natur. Dipt.* I, p. 107), which is likewise an *Eriocera* with four posterior cells. His *Limnophila bicolor*, from Bengal, *Dipt. Exot.* Vol. I (antennæ also broken), is apparently an *Eriocera*, put

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among the *Limnophilæ* on account of its five posterior cells; whether his *Limnobia sumatrensis* (*Dipt. Exot. Suppl.* 4e) likewise belongs here is less certain; it has four posterior cells.

In the same year with Macquart's *Eriocera*, the genus *Evanioptera* (*E. fasciata* Guér., from Brazil) was published by Mr. Guérin (*Voyage de la Coquille, Zoologie*, Texte II, 2, p. 287; Tab. XX, fig. 2, Insectes). The volume of the letter-press, as appears from the date of Mr. Guérin's preface, was issued in 1838; the volume of the plates, however, must have appeared much earlier. On the plate the new genus was named *Caloptera*, but as this name had been used by another author in the interval which elapsed before the publication of the text, Mr. Guérin changed it in *Evanioptera*. In the mean time Mr. Westwood, who had seen the plate representing *Caloptera*, identified with it a species from Nepaul, which he described (*Ann. Soc. Entom. de Fr.* 1835, p. 681) as *Caloptera nepalensis*.[1] *Evanioptera* is an *Eriocera* with four posterior cells.

Pterocosmus, a genus introduced by Mr. Walker (*List*, etc. I, p. 78), in 1848, is based upon some Asiatic *Erioceræ*, mostly of dark coloring, with dark and banded wings. Seven species from the Sunda Islands, China, and Nepaul have been described by Mr. Walker, in the above-quoted work, and in the *Journ. Proc. Lin. Soc. Zool.* I, p. 105, 1857.

Oligomera Doleschall, published in 1857 (*Tweede Bidrage*, etc. p. 11, Tab. VII, fig. 3), is likewise a genus based upon a species of *Eriocera* (*O. javensis*), from Java. It has four posterior cells, and the antennæ of the male are short, eight-jointed; the joints of the flagellum are said to be of nearly equal length.

Limnobia albonotata Loew, from Mozambique, described in the work on Mr. Peters' voyage to that country, is an *Eriocera*.

Physecrania Bigot (*Ann. Soc. Entom. de France*, 1859, p. 123, Tab. III, fig. 1), is an *Eriocera* with short antennæ in the male and five posterior cells. It shows some peculiarities which may perhaps justify a generic separation, but it has nothing in common with *Cylindrotoma*, the author's statement notwithstanding. The species *P. obscura* Bigot, is from Madagascar.

[1] It was a mistake on my part when I stated in the *Proc. Acad. Nat. Sci. Philad.* 1859, p. 246, that *Evanioptera* probably belongs to the same section with *Amalopis*.

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In 1859 (*Proc. Acad. Nat. Sci. Philad.* 1859, p. 243) I described the North American *Eriocera fuliginosa*, which has short antennæ in both sexes. At the same time I founded the genus *Arrhenica* for two other species, *E. spinosa* and *E. longicornis*, both distinguished by the enormous length of the antennæ of the male, and by the structure of these antennæ, the under side of which is beset with a row of erect, spine-like bristles. The only species of *Eriocera* I had seen at that time was *E. fuliginosa*, which, on account of its short male antennæ, I recognized as the true *Eriocera* Macq. Since then, a more extensive knowledge of the species of this group convinced me of the fact that *Arrhenica* stands in the same relation to the *Erioceræ* with short male antennæ, as the *Anisomeræ* and *Penthopteræ* with long male antennæ stand to the species of these genera with short antennæ. If a larger number of species, distinguished by the same characters as the two above-mentioned ones, is discovered, the name *Arrhenica* may be used for them as a subgeneric name; but there is no necessity to maintain it at present as a separate genus.

In 1863 (*Wiener Entom. Monatschr.* VII, p. 220, and afterwards in the *Fauna Austr. Diptera*, Vol. II, p. 534), Dr. Schiner proposed the genus *Penthoptera*, based upon a peculiar form of *Eriocera*, represented by two species in Europe, to which I have since added one from the United States.

The foregoing historical account shows how abundant in species the genus *Eriocera* is, and how little is known about them. *Erioceræ* from all parts of the world have been described at different times and under different generic names, without any apparent recognition of the fact that they all belong to a large group, numerously represented in the warmer latitudes. It is probable that, upon closer comparison of the species scattered in different collections in Europe, the genus *Eriocera*, as defined here, will be subdivided in smaller groups, and that some of the genera, alluded to above as belonging to *Eriocera*, will be found to coincide with these groups.

These exotic species are distinguished for the most part by their brilliant coloring; that of their wings especially distinguish them from the North American and the European species; they are often dark, with bands and spots of a lighter color. The Asiatic species are often of a deep velvet black, with brown wings, banded and spotted with white.

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It seems that *Erioceræ* with *five* posterior cells are more abundant in Asia, whereas those with *four* prevail in South America. The three Asiatic species, described in Wiedemann: *basilaris*, *acrostacta*, and *mesopyrrha*, and Macquart's *bicolor* (if the two latter are *Erioceræ*) have five posterior cells; *Physecrania* Bigot, from Africa, likewise. Nevertheless, *Limnobia diana* Macq., from Bengal, *Caloptera nepalensis* Westw.,[1] from Nepaul, and *Limnobia sumatrensis* Macq., from Sumatra, have four posterior cells. The numerous *Erioceræ* from South America which I have seen in the Berlin Museum, as well as the above-quoted South American species, described by Wiedemann, Macquart, and Guérin, all have four posterior cells. That this law should be general, I doubt very much, but it is remarkable enough that it should be so prevalent, and that among a considerable number of South American species there should not be a single one with five posterior cells, while in North America, among four species which are known, one has that number of cells.

Another, not less remarkable circumstance is, that among this large number of specimens, described in works or seen by me in collections, I did not find a single one provided with very long antennæ in the male sex, such as distinguish three North American species of *Eriocera* and one *Penthoptera*. Many species, it must be admitted, were represented by females only; the antennæ of several others were broken; but among the twenty-four species of the Berlin Museum, eleven were represented by males with well-preserved antennæ, and all these antennæ were short.

Among the Diptera included in amber, which I have had an opportunity to examine in Mr. Loew's collection, there is the genus *Allarithmia*, with a single species, *A. palpata* (Loew, *Bernstein u. Bernsteinfauna*, 1850, p. 38), which is a female *Eriocera* with four posterior cells, ten-jointed antennæ, and an elongated last joint of the palpi. There were, moreover, two species of *Eriocera* represented by males with long antennæ. One of them has been mentioned in the above-quoted paper of

[1] Westwood's *Caloptera nepalensis* has only four posterior cells, if this author is right in quoting Guérin's figure of the South American *Evaniioptera*. *Pterocosmus* Walker, with several Asiatic species, has also four cells, if I decipher right the description of the wing in *List*, etc. I, p. 78; but I may easily have been mistaken in my interpretation.

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Mr. Loew under the name of *Anisomera succini;* the other was at the time undescribed. Thus while on one side we have four North American species, three of which with long antennæ, and three amber species, two of which with long antennæ; on the other side we see dozens of exotic *Erioceræ*, and, as far as known, not a single one with long antennæ among them. A new proof of the remarkable relationship of the North American and the amber fauna!

Table for determining the species.

1	Five posterior cells.	1 **spinosa** *O. S.*
	Four posterior cells.	2
2	Body light reddish.	3 **wilsonii**, n. sp.
	Body dark gray or brown.	3
3	Halteres pale.	2 **longicornis** *Walk.*
	Halteres brown.	4 **fuliginosa** *O. S.*

Description of the species.

A. Antennæ of the male very long and much longer than those of the female.

1. Antennæ of the male glabrous on the upper side, and with a series of bristles inserted at regular intervals, on the under side (subgenus **ARRHENICA**).

1. E. spinosa O. S. ♂ and ♀.—Fuscescens, thoracis vittis fuscis; antennis maris corpore duplo longioribus, in paginâ inferiori serie spinarum parvarum; halteres capitulo obscuro; cellulis posterioribus quinque; ovipositor feminæ valvis superioribus longis, acuminatis.

Brownish, thorax with brown stripes, antennæ of the male more than twice the length of the body, on the under side with a row of spines or bristles; knob of the halteres dark; five posterior cells; ovipositor of the female with elongated, pointed upper valves. Long. corp. ♂, 0.45—0.6; ♀, 0.9.

Syn. *Arrhenica spinosa* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 244.

Male. Head very downy, brownish-gray, tawny on the under side and on the front side of the tubercle; palpi dark brown, long; first, second, and fourth joints elongated; antennæ more than twice as long as the body, black, two basal joints tawny; if bent backwards, the tip of the third joint would reach a little beyond the root of the wings; the fourth joint is longer than the third, and each of the following joints is longer than the preceding one; the sixth is as long or longer than all the others together. Thorax brownish-gray, clothed with a soft grayish down; four

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brownish stripes above, the intermediate ones approximated; pleuræ with a hoary reflection on their lower part; halteres pale at the basis, knob blackish; coxæ hoary, trochanters and basis of the femora yellowish-tawny; femora and tibiæ tawny, with brown tips; tarsi brown. Abdomen dark brownish, downy; lateral edges, especially beyond the third segment, yellowish, venter paler; forceps tawny; its structure like Tab. IV, fig. 29. Wings tinged with brownish; costal and subcostal cells of a more saturated tawny color; stigma oblong, brown, placed between the subcostal and stigmatical cross-veins; first submarginal and first posterior cells about equal in length; the second submarginal is longer; five posterior cells; petiole of the second cell about as long or a little longer than the cell itself.

Female. Like the male, but much larger; body of a reddish-brown, instead of a grayish-brown tinge, less downy; the antennæ are not longer than the head and thorax taken together; they have no spines, but only sparse hairs; ten indistinct joints can be counted; ovipositor ferruginous; upper valves elongated, almost imperceptibly arcuated, ending in a blunt point.

Hab. Trenton Falls, N. Y.; Massachusetts (Scudder). I possess two males and one female. The front femora of one of the males are much shorter than those of the other.

2. E. longicornis Walk. ♂ and ♀.—Obscure cinerea, thoracis vittis obscuris; antennis maris corpore duplo longioribus; in paginâ inferiori serie spinarum parvarum; halteribus pallidis; cellulis posterioribus quatuor; ovipositor feminæ brevis, valvis superioribus brevissimis, obtusis.

Dark gray, thorax with blackish stripes; antennæ of the male twice the length of the body, on the under side with a row of small spines; halteres pale; four posterior cells; ovipositor short; upper valves shorter than the lower ones, obtuse. Long. corp. 0.4—0.5.

Syn. *Anisomera longicornis* Walker, List Dipt. Brit. Mus. I, p. 82.
Arrhenica longicornis O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 245.

Head gray, frontal bump very large, abrupt; palpi black, antennæ black; two basal joints grayish; antennæ of the male three or four times longer than the body; the third joint, if bent backwards, would reach beyond the root of the wing; every following joint is longer than the preceding; the sixth joint as long as the fourth and fifth together; the spines on the lower

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surface of the antennæ become short and indistinct towards its end; besides the spines there is a microscopic pubescence on the same side of the antennæ; antennæ of the female hardly reaching beyond the root of the wings; no spines, but hairs; two basal joints and base of the third yellowish; third joint as long as the two first taken together; the fourth less than half so long as the third; the fifth a little longer than the fourth; the following three joints are of about the same length; the ninth is a little longer and the tenth a little shorter than the preceding ones. Thorax gray; a long straight pubescence on the sides in the male, no such pubescence in the female; three blackish stripes on the mesonotum; intermediate stripe cuneiform; the lateral ones abbreviated before and extended beyond the suture behind; the lower portion of the pleuræ hoary; scutellum and metathorax gray; halteres pale; coxæ gray, trochanters and femora tawny, except the tip of the latter, which is brown; tibiæ and tarsi dark brown. Abdomen grayish-black; forceps of the same color; ovipositor of the female very short; its structure like that of *Anisomera;* upper valves blunt, much smaller than the lower ones. Wings slightly tinged with brownish; veins, but especially the præfurca, the central cross-veins, and the fifth longitudinal vein faintly clouded with brown; the second submarginal cell a little longer, the first distinctly shorter than the first posterior cell; four posterior cells; stigma brown.

Hab. Trenton Falls, N. Y.; Maine (Packard); Illinois (Kennicott); Massachusetts (Packard). Three males and two females. One of the males has the front and middle femora about half so long as the hind ones; another specimen, however (from Massachusetts), has the front femora at least two-thirds the length of the hind ones; the middle femora are a little shorter. The latter specimen, moreover, has a brownish abdomen, with distinct yellowish lateral margins, and a dark tawny forceps (it resembles the abdomen of *E. spinosa*); the thoracic stripe is not attenuated posteriorly; the frontal bump is smaller, etc. I am not sure whether it is a different species or not. The third male specimen, as well as the females, have their feet broken off, which prevents me from making any general statement about the relative length of the femora in this species.

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2. Antennæ of the male much longer than those of the female, finely pubescent on both sides.

E. wilsonii, n. sp. ♂.—Ferruginea, maculis humeralibus atris; antennis maris corpore longioribus, pubescentibus; cellulis posterioribus quatuor; halteribus fuscis.

Ferruginous, with deep black humeral spots; antennæ of the male longer than the body, pubescent; four posterior cells; halteres brown. Long. corp. 0.4.

Male. Body yellowish-red; palpi rather short, brownish towards the tip; antennæ more than once and a half the length of the body; clothed on both sides with a delicate, short pubescence; on the under side with some scattered stronger bristles; the third joint, if bent backwards, would reach beyond the basis of the abdomen; the fourth is nearly of the same length with the third; the basal portion of the antennæ is red; the remainder, beginning with the tip of the third joint, brown. Thorax shining above, with two more or less distinct, often almost obsolete, brownish stripes; a deep black, elongated spot between the collare and the root of the wings; a brownish spot above it, near the suture, and another one on the other side of the suture, above the root of the wings; knob of the halteres more or less dark brown. Abdomen, including the forceps of the males, reddish-yellow. Feet yellowish tawny, tip of the femora, of the tibiæ, and the latter portion of the tarsi brownish. Wings with a pale brownish-yellow tinge; stigma pale brownish; often, but not always, a stump of a vein near the origin of the præfurca; four posterior cells.

Hab. Delaware (Dr. Wilson); three male specimens.

B. Antennæ short in both sexes.

E. fuliginosa O. S. ♂ and ♀.—Obscure fusca, alis fuscis; antennis maris et feminæ æque longis, brevibus; cellulis posterioribus quatuor; halteribus fuscis.

Dark brown, wings brown; antennæ in both sexes of the same length, short; four posterior cells; halteres brown. Long. corp. 0.4—0.5.

Syn. *Eriocera fuliginosa* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 243.

Lower part of the head and rostrum tawny; palpi black; antennæ black; short in both sexes; when bent backwards, they would not reach beyond the root of the wings; basal joints yellowish-ferruginous. Thorax dull dark brown, with a slight yellowish-gray reflection above; four more or less distinct dark brown

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stripes on this grayish ground; halteres brown; feet ferruginous; tips of the femora and of the tibiæ brown; tarsi brown. Abdomen brown, shining; male forceps tawny; its structure like Tab. IV, fig. 28; ovipositor ferruginous, tawny at the basis. Wings brown, clouded along the veins; stigma still darker brown; four posterior cells; first submarginal cell but little more than half the length of the second; the marginal cross-vein close by the inner end of the first submarginal cell.

Hab. Berkeley Springs, Virginia; Washington, D. C. I had nine male and one female specimen when I first described this species. I possess, moreover, two males from Virginia and a female from Ohio, the coloring of which is very like that of *E. longicornis*, gray with brownish stripes on the thorax; the wings are only slightly tinged with brownish; the knob of the halteres is dark brown; the first submarginal cell is short, with the cross-vein close by its inner end. The difference in the coloring from the typical specimens of *E. fuliginosa* is very considerable; but I fail to discover any essential differences.

Gen. XXXIV. PENTHOPTERA.

Two submarginal cells; four or five posterior cells; a discal cell; the subcostal cross-vein at the very tip of the auxiliary vein; the first submarginal cell shorter than the second; *stigma very small, occupying but a small portion of the interval between the tip of the auxiliary vein and the marginal cross-vein;* wing-veins distinctly pubescent. Gibbosity on the front comparatively small; antennæ six-jointed in the male, sometimes much longer than those of the female, sometimes of the same length; antennæ of the female ten-jointed, comparatively short. Tibiæ with short spurs at the tip; ungues small; empodia small, but distinct. Male forceps like that of *Eriocera*.

This genus has been proposed by Dr. Schiner for the European species *P. chirothecata* Scop. and *cimicoides* Scop., with the first of which the North American *P. albitarsis* is most unmistakably allied. Although these three species have all the characters of *Eriocera*, it is easy to perceive peculiarities in their general appearance and their coloring, which justify their separation. The wings are more elongated, the wing-veins seem to be more slender, less dark in coloring; the cells in the apical portion of the wing are longer, the veins enclosing them less diverging, more parallel, and much more distinctly pubescent; the fringe of hairs along the posterior margin of the wings is longer; the stigma is

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very much smaller, occupying but a small portion of the space between the tip of the auxiliary vein and the marginal cross-vein; the subcostal cross-vein is still nearer to the tip of the auxiliary vein; the marginal cross-vein, on the contrary, a little more distant from the tip of the first longitudinal vein. Both *P. chirothecata* and *P. albitarsis* have the tarsi white—a striking character not observed in the genus *Eriocera;* compared to the tibiæ, the tarsi are shorter here than in *Eriocera*, especially the hind ones.

As in *Eriocera*, the antennæ of the male are sometimes very long, and much longer than those of the female (*P. albitarsis*); sometimes they are short in both sexes (the two European species). The occurrence, in the different species, of either five or of four posterior cells also reminds of the former genus (*P. albitarsis* and *chirothecata* have five, *P. cimicoides* four of such cells).

The antennæ of the male are apparently six-jointed; on those of a fresh specimen of the female of *P. albitarsis* I have distinctly counted ten joints. Those of the two European species, in both sexes, when bent backwards, would hardly reach beyond the root of the wings; the third joint is the longest; the flagellum is sparsely clothed with hairs. The antennæ of the female of the North American species have exactly the same structure; those of the male are nearly as long as the body, filiform, covered with a short, soft pubescence. The structure of the palpi seems to be like that of *Eriocera*. The male forceps, likewise, resembles that of *Eriocera;* the ovipositor has the ordinary structure; the upper valves are slender, pointed, and very gently arcuated.

As I have observed in my remarks on the preceding genus, the subdivisions of *Eriocera* have been too little studied yet, as to decide upon the relative value and position of the allied genera; *Penthoptera* is among the number of the latter.

Dr. Schiner has described a new species (*P. fuliginosa*) from Columbia, South America (*Reise d. Novara, Diptera*, p. 42).

The name of the genus is probably derived from πένθος, sorrow, and πτερόν, wing, in allusion to the dark-colored wings of the European species.

Description of the species.

1. P. albitarsis, n. sp. ♂ and ♀.—Fuscana, capite supernè pruinoso, tarsis albis; antennis maris longitudine corporis, feminæ multo brevioribus; cellulis posterioribus quinque.

17 October, 1868.

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Brownish; head above with a thick bluish bloom; tarsi white; antennæ of the male as long as the body; those of the female much shorter; five posterior cells. Long. corp. 0.25—0.3.

Head brownish above, with a bluish bloom, which sometimes entirely conceals the brown; yellowish-tawny below; palpi brownish, except the basis, which is yellowish; antennæ brown, two basal joints yellowish-tawny; those of the male nearly as long as the body, clothed with a dense, delicate pubescence; those of the female, if bent backwards, would hardly reach beyond the root of the wings. Thorax yellowish-tawny, brownish above, shining, and with a slight gray or bluish bloom upon the brown; four darker stripes are sometimes indistinctly marked; halteres brownish; abdomen brown, venter yellowish, the male forceps and the basis of the ovipositor are likewise yellowish; coxæ yellowish, feet brown, tarsi white; last joint somewhat brownish. Wings slightly tinged with brownish; stigma almost imperceptible; first submarginal cell but little shorter than the first posterior; marginal cross-vein at a considerable distance beyond the inner end of the first submarginal cell; five posterior cells; the petiole of the second is rather long.

Hab. New London, Conn., on the sea-beach, a female; Pennsylvania (Cresson), a male. I have only these two specimens before me; the male is considerably smaller than the female, the petiole of the second posterior cell is comparatively much longer, the wings are more brown; but the agreement of the two specimens in other respects is perfect. Both specimens had only the hind tarsi left.

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Section VI. AMALOPINA.

Two submarginal cells; four or five posterior cells; discal cell closed or open; *subcostal cross-vein* far removed from the tip of the auxiliary vein and *anterior to the origin of the second longitudinal vein* (Tab. II, fig. 14–18). Tibiæ with spurs at the tip; empodia distinct. *Eyes pubescent;* front usually with a more or less distinct gibbosity. Normal number of antennal joints *sixteen* or *thirteen*.

The *Tipulidæ* of this section form two natural groups, based upon the number of joints of their antennæ, and the peculiarities of their venation.

Pedicia and *Amalopis* have 16-jointed antennæ; the second submarginal cell is (in all cases which came under my observation) never longer, although generally but very little shorter, than the first posterior cell; the præfurca is rather elongated (Tab. II, fig. 14, 15); the palpi seem to be usually longer than in the following group.

Dicranota, *Rhaphidolabis*, and *Plectromyia* have 13-jointed antennæ; the second submarginal cell is never shorter than the first posterior, generally a little longer; the præfurca is very short (Tab. II, fig. 16–18; for more details concerning the differences between these two groups, compare the genus *Amalopis*).

The characters common to the two groups, and at the same time distinctive of the *Amalopina* are: the position of the subcostal cross-vein; the pubescent eyes; the frequent occurrence of the frontal gibbosity; the frequent absence of the discal cell, especially in the second group; the peculiar shape of the penultimate posterior cell (compare Tab. II, fig. 14–18), the inner end of which is always much more extended inwards than in the majority of the brevipalpous *Tipulidæ*. This character, imparting a pentagonal shape to the discal cell whenever it is closed, is also of general occurrence among the *Tipulidæ longipalpi*. Among the latter the penultimate posterior cell, as a rule, has

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its inner end in one line with the inner end of the last posterior cell; a form of venation which is not altogether foreign to the *Amalopina* also (compare *A. vernalis* O. S., *opaca* Meig., etc.).

This last character, the peculiar shape of the penultimate posterior cell, is only wanting in the genus *Ula*, which, with its 17-jointed antennæ and its pubescent wings, seems to form a group for itself, without any particular affinity to the other two; its position among the *Amalopina*, however, is abundantly vindicated by its other characters.

The separation of the *Amalopina* from the genus *Limnobia* in the sense of Meigen is of too recent date yet, as that we should know much about its relative position with regard to the other sections of the *Tipulidæ*. The pubescence of the eyes seems to be peculiar to the *Amalopina*, and has not been observed in any other *Tipulidæ*, except in *Trichocera*. And it is singular enough that in all the species hitherto observed this character should be accompanied by another, equally peculiar to this group, the position of the subcostal cross-vein, anterior to the origin of the second longitudinal vein and so far removed from the tip of the auxiliary vein. The coincidence of such characters, together with the structure of the male forceps (differing from the types prevailing in the other sections) constitute a compact and well characterized group.

About the occurrence of *Amalopina* in the other parts of the world, besides Europe and North America, almost nothing is known. The venation of *Polymera fusca*, from Brazil, figured in Wiedemann's *Auss. Zw.* Vol. I, Tab. VI, fig. *b*, 4, strongly reminds of *Rhaphidolabis;* the tibiæ of this genus have spurs at the tip; the antennæ are 28-jointed, pubescent (sometimes, however, 14-jointed? comp. Wied. l. c. p. 554). I have never seen this genus; the descriptions of Wiedemann and Macquart (*Dipt. Exot.* I, 1, p. 64, Tab. 8) are not sufficient to determine its position with certainty (that of Wiedemann is translated in the Appendix II).

Gen. XXXV. AMALOPIS.

Two submarginal cells; five posterior cells; discal cell generally present, sometimes wanting; the subcostal cross-vein is more or less anterior to the origin of the second longitudinal vein; the second submarginal cell is never longer (usually distinctly shorter) than the first posterior cell; the tip of the wing is rounded in both sexes (not sinuate posteriorly

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as in *Pedicia*). Tibiæ with spurs at the tip; empodia distinct; ungues smooth. Eyes pubescent; front with a gibbosity behind the antennæ; the latter 16-jointed, short (not reaching much beyond the collare when bent backwards). Male forceps more or less club-shaped, with stout, branched horny appendages.

Rostrum short, with large, hairy lips; epistoma much broader than long; palpi comparatively long; the last joint is longer than the preceding, but usually shorter than the two preceding joints taken together.[1] The eyes are pubescent, separated above by a moderately broad front; on the under side of the head, the space separating them is narrow; the gibbosity on the front, behind the antennæ, is sometimes small, but always perceptible. Antennæ 16-jointed, very short; first and second joints of the usual shape; the flagellum of some species (as *A. vernalis* O. S., *auripennis* O. S., *immaculata* M.) is strongly incrassated at the basis, the joints being closely packed together; the tip is tapering and slender; in other species, however, this incrassation is not perceptible, and the joints are well separated from each other (*A. calcar* O. S.); the under side of the flagellum, especially in the males, is clothed with a short, dense pubescence; the opposite side has longer, verticillate hairs. Collare rather long, well developed; thoracic suture well marked. Feet long, moderately strong; the spurs at the tip of the tibiæ vary in length and distinctness; in *A. calcar* they are very long and divaricate, and therefore conspicuous; much less so in the other species; front tarsi (♂) rather long, about once and a half or once and a quarter the length of the tibia; hind tarsi as long or a little longer than the tibia; the four last tarsal joints taken together are equal to three-quarters or more of the first joint. The wings (compare Tab. II, fig. 14, wing of *A. calcar*; fig. 15, of *A. inconstans*) are of moderate breadth; generally slightly broader in the female. The tip of the auxiliary vein is nearly opposite the tip of the fifth longitudinal vein; the subcostal cross-vein is more or less anterior to the origin of the second longitudinal vein; the distance between them is equal to about one length of the great cross-vein in *A. auripennis* and *calcar*, two such lengths in *A. inconstans*, three lengths or more in *A. hyperborea*, *immaculata*, and *vernalis*. The tip of the first longitudinal vein is opposite the tip of the

[1] I have observed the palpi of living specimens of *A. calcar*, *inconstans*, and *vernalis*.

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third branch of the fourth vein; the marginal cross-vein is at, or very near this tip. The præfurca, the origin of which is about the middle of the length of the wing, is rather long, arcuated or angular near the basis (in the latter case generally with a stump of a vein); its further course is generally straight, *in a line with the third longitudinal vein.* The relations between the two branches of the second vein, the third vein, and the small cross-vein are very peculiar in this genus, and deserve a particular attention (compare the figures 14 and 15 of Tab. II): 1. The small cross-vein always connects the fourth longitudinal vein with the second vein or the posterior branch of this vein; never with the third vein, as is almost universally the case among the Diptera; in other words, the third vein in the genus *Amalopis* (at least in all the instances observed by me) always issues from the second beyond the small cross-vein. Hence, it is a peculiarity of *Amalopis* (and this applies also to *Pedicia*), that the *second submarginal cell is never longer than the first posterior cell,* generally a little shorter. From among all the other *Tipulidæ,* I am aware of two genera only, where the position of the small cross-vein, above alluded to, is to be met with: *Ptychoptera* and *Bittacomorpha.* Even in *Erioptera* (subg. *Molophilus,* compare Tab. I, fig. 19), the venation of which otherwise reminds of *Amalopis,* the small cross-vein has the usual position, between the third and the fourth veins. 2. The first submarginal cell is either shorter than the second, which is the normal venation among the *Tipulidæ;* or it is longer than the second submarginal (Tab. II, fig. 14), a form of venation occurring also among the *Eriopterina* of the subgenus *Molophilus* (see Tab. I, fig. 19), and the *Ptychopterina* (Tab. II, fig. 19, 20). We might express the difference between these two forms of venation by saying that, in the first case, the second vein is forked, in the second case, the third; but this would be a deviation from the terminology adopted by us and according to which it is always the second and never the third vein which bears the fork. The first submarginal cell is *longer* than the second in the American species *A. hyperborea, vernalis, calcar,* and the European species *A. unicolor* Schum. and *immaculata* Schum.); the first submarginal cell is *shorter* than the second in *A. auripennis* O. S., in the normal specimens of *A. inconstans*

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O. S., and in the European species *A. littoralis* M., *schineri* Egg., *occulta* M. The structure of the posterior fork of the fourth vein undergoes some modifications which deserve likewise to be mentioned. In most of the species (*auripennis*, *hyperborea*, *calcar*, *inconstans*, and the European *littoralis* M., *tipulina* Egger, *schineri* Kolen., *unicolor* Schum., *immaculata* Schum.) this fork is petiolate, or in other words, the inner end of the fourth posterior cell (enclosed by this fork) is more remote from the basis of the wing than the inner end of the discal cell, or when it is open, of the third posterior cell. In *A. vernalis*, however, as well as in the European *A. occulta* M., *gmundensis* Egger, and *opaca* Egger, the posterior fork of the fourth vein is sessile, that is, the origin of the branch forming it is coincident with the first branching of the fourth vein; hence, the inner end of the fourth posterior cell is equidistant from the basis of the wing with the inner end of the discal cell, or, when it is open, of the third posterior cell. The discal cell is closed in the normal specimens of *A. calcar*, *vernalis*, and *inconstans*; it is likewise closed in the two remaining North American species, *A. auripennis* and *A. hyperborea*, of which, however, I have only single specimens before me; also in the European *A. tipulina* Egger. In the European *A. littoralis* M., *schineri* Kol., and *unicolor* Schum., the discal cell seems to be variable, sometimes closed, often open. In *A. occulta* M., *immaculata* Sch., *gmundensis* and *opaca* Egger, it is open (at least in normal specimens).[1] The shape of the discal cell is usually pentagonal; but in *A. vernalis*, owing to the above-mentioned structure of the posterior fork of the fourth vein, it is elongated and narrow. When the discal cell is closed, the second posterior cell is usually petiolate; in *A. vernalis* it is sessile; in most specimens of *A. inconstans* it is sessile or subsessile. The small cross-vein is generally in one line with the inner end of the discal cell (or of the third posterior cell, when the discal is open), and often with the great cross-vein; this relation is somewhat variable in *A. inconstans*. The fifth longitudinal vein is somewhat arcuated towards the end; the sixth and seventh are straight, or almost so. In *A. hyperborea* the second basal cell is divided in two by a supernumerary cross-vein; the same is the case with the Euro-

[1] The data about the European species are taken from Dr. Schiner's work.

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pean *A. varinervis* Zett. The stigma is elongated and but little defined.

The abdomen of the male is elongated, often attenuated at the basis, and more or less club-shaped at the tip. The forceps of *A. inconstans* (Tab. IV, fig. 30) consists of a pair of coriaceous basal pieces, hollow inside (*c c*); each of these has a large horny appendage, with two branches directed upwards (*a a*), and a soft fleshy and pubescent lobe (*b*); moreover, there is a pair of smaller horny appendages (*h*) inside of the forceps (compare also the details given in explanation of the plate). The forceps of the other species seems to be formed pretty much on the same plan. The ovipositor of the female has moderately long and broad, somewhat arcuated and pointed upper valves.

The species of *Amalopis* are of medium size, some of them comparatively large; they occur in damp situations; nothing is known about the habits of their larvæ, which are probably aquatic, like those of *Pedicia*. *Amalopis* is very closely allied to the latter genus, and it is rather difficult to find a satisfactory character to distinguish them. From *Dicranota*, *Rhaphidolabis*, and *Plectromyia*, the present genus, as well as *Pedicia*, are distinguished by the number of antennal joints, by the circumstance that, on account of the peculiar position of the small cross-vein, already explained, the second submarginal cell is never longer than the first posterior, and by the frequent occurrence of the form of venation in which the first submarginal cell is longer than the second (compare also the general remarks on the *Amalopina*, p. 259).

I possess five North American species of *Amalopis*, and Dr. Schiner enumerates nine European ones, some of which, however, are probably synonymous. I have every reason to believe that *Limnobia varinervis* Zett., from Norway, which I know only from the description (Zett. *Dipt. Scand.* X, p. 3813), is an *Amalopis*. *Limnobia congrua* Walker, *List*, etc. I, p. 42, from Swan River, is an *Amalopis;* I have seen it in the British Museum.

The genus *Amalopis* (from ἁμαλός, soft, and ὤψ, face) was first proposed by Mr. Haliday for *Limnobia occulta* M., in Walker's *Ins. Brit. Diptera*, Vol. III, 1856. It was not incorporated into the work, however, but introduced in a note among the Addenda and Corrigenda (l. c. p. xv), after the work had been completed. Mr. Haliday points out the hairy eyes, the frontal tubercle, and

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the absence of a discal cell of this species, and says that it is the type of a new genus *Amalopis*. In the *Proc. Acad. Nat. Sci. Philad.* 1859, p. 245, I have further developed this suggestion, by adding to the characters of *Amalopis* the position of the subcostal cross-vein, and establishing upon that character the group of *Pediciæformia* (now *Amalopina*). At that time I described three North American species, to which I have since (*Proc.*, etc. 1861, p. 291) added two new ones. Dr. Schiner (*Fauna Austr. Diptera*, 1864, Vol. II, p. 527) referred to *Amalopis* the European species belonging to it, and which had been previously mixed up with the *Limnobiæ*.

Crunobia, a generic name proposed by Kolenati for *Amalopis schineri* Kol. (*Wien. Entom. Monatschr.* IV, p. 393; 1860), is a synonym of *Amalopis*.

The genus *Tricyphona*, established by Zetterstedt, in the *Ins. Lapponica*, 1840, and retained in all the later publications, even in Dr. Schiner's *Fauna Austriaca, Diptera*, is, according to my opinion, not sufficiently distinguished from *Amalopis*, to be retained as a separate genus. I suspected this already in 1859, but it has become evident to me recently, since I obtained specimens of *T. immaculata* M., the only species upon which this genus is based. If *T. immaculata* has been separated from *Limnobia* so early, it was principally on account of its discal cell being always open, a character of altogether secondary importance. Although the name *Tricyphona* is older than *Amalopis*, I believe that, as a matter both of right and of expediency, the latter name has to be maintained.[1] The genus *Bophrosia* Rondani, is a synonym of *Tricyphona*.

[1] The almost absolute rules of priority recognized for specific names are not equally applicable to the generic ones. In the present instance the genus *Amalopis* may be said to have been unknown until 1856, when Mr. Haliday pointed out one of its principal features, and 1859, when I showed its true extent and defined its character. Zetterstedt's definition of *Tricyphona* is not applicable to *Amalopis*, as it is principally based upon the absence of the discal cell, a character of mere casual occurrence. If the mere invention of a name gave a right to priority, we should call *Rhamphidia* by the name of *Helius* St. Fargeau, and adopt *Helobia* St. Fargeau, instead of *Symplecta*.

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Table for determining the species.

1	Anterior margin of the wings shaded with brownish.	1 **inconstans** *O. S.*
	Anterior margin of the wing not shaded with brownish.	2
2	Wings spotted with brown.	3
	Wings not spotted with brown.	4
3	The inner end of the fourth posterior cell is in one line with the inner end of the fifth and of the discal cells.	5 **vernalis** *O. S.*
	The inner end of the fourth posterior cell is beyond the inner end of the fifth and of the discal cells.	4 **hyperborea** *O. S.*
4	First submarginal cell shorter than the second.	2 **auripennis** *O. S.*
	First submarginal cell longer than the second.	3 **calcar** *O. S.*

Description of the species.

1. A. inconstans O. S. ♂ and ♀.—Ochracea, thorace rufescente, abdomine obscuriori; alarum margine antico et venulis transversis infuscatis; præfurcæ initium appendiculatum; cellula submarginalis prima secundâ brevior.

Ochraceous, thorax reddish, abdomen somewhat darker; anterior margin of the wings and transverse veins infuscated; the præfurca has a stump of a vein near its origin; the first submarginal cell (in normal specimens) is shorter than the second (Tab. II, fig. 15). Long. corp. 0.45—0.55.

Syn. *Amalopis inconstans* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 247.

Coloring very inconstant; ochraceous, more or less mixed with brown on the thorax and the abdomen; sometimes altogether without brown. The following is the description of the specimens with a fully developed dark coloring:—

Rostrum and palpi brown; front grayish; under side of the head yellowish; antennæ pale, but little longer than the head; basal joint generally brownish; flagellum with moderate verticils. Collare ochraceous, a black ring near the head, a brown stripe along the middle; mesonotum yellowish-orange, with a slight brown tinge along the middle; stripes indistinct; back of the suture, the thorax is brownish; scutellum and metathorax are paler in the middle; pleuræ pale; halteres pale; feet yellow, femora and tibiæ faintly brownish at the tip; tips of the tarsal joints, and their last joint brown. Abdomen brown, especially towards the tip; male genitals brown; ovipositor reddish. Wings tinged with light brownish; anterior margin, especially within

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the costal and subcostal cells, infuscated; all the cross-veins have brown clouds, as well as the origin of the præfurca.

This is the normal coloring, but among eighteen specimens which I had before me, only four showed it in its full development. All the others were more or less paler about the collare, the scutum, the scutellum, the metathorax, and the abdomen; sometimes with slight indications of brown, sometimes without any. The coloring of the wings is also variable, the fuscous tinge of the anterior margin and the clouds on the cross-veins being sometimes very pale. Still, a trace of the brown tinge of the anterior margin of the wings and a brown ring on the anterior part of the collare, near the head, are always left, and help to recognize the species.

The venation of this species is also very variable. In the majority of specimens the first submarginal cell is shorter than the second (Tab. II, fig. 15); in other words, it is the second longitudinal vein which is forked. Sometimes (in two specimens among eighteen) the reverse is the case; it is the third vein which is forked, and hence the first submarginal cell is longer than the second.

In normal specimens the second posterior cell is sessile; in rather rare cases it is petiolate. The discal cell, in the majority of specimens, is closed; in three specimens among eighteen I find it open. The position of the great cross-vein is also somewhat variable; sometimes it is opposite the inner end of the discal cell, sometimes beyond it. The presence of a stump of a vein, usually long and distinct, near the basis of the præfurca, is a very constant character of this species. Adventitious cross-veins in the second submarginal cell are of frequent occurrence; sometimes two or three in succession. Occasionally they occur also in other cells, for instance in the second posterior cell. (Tab. II, fig. 15, represents a strongly colored wing of *A. inconstans* with two adventitious cross-veins in the second submarginal cell.)

Hab. Atlantic States, rather common in the spring; I have collected it in abundance at the Virginia Springs and in the White Mountains; also near Washington and New York.

I possess two specimens from Europe which are similar, in all respects, to the paler varieties of *A. inconstans*. The description of *A. tipulina* Egger (Schiner's *Fauna Austriaca, Diptera*, II, p. 528), agrees quite well with these specimens. The question arises whether *A. tipulina* is distinct from *A. littoralis* Meig.?

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2. A. auripennis O. S. ♂.—Fuscana, alis immaculatis, venulis transversis centralibus anguste fusco-marginatis; cellula submarginalis prima secundâ parum brevior.

Brownish, wings immaculate, central cross-veins slightly clouded with brown; the first submarginal cell is a little shorter than the second. Long. corp. 0.5.

Syn. *Amalopis auripennis* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 247.

Head grayish, vertex slightly brownish in the middle; palpi brown, somewhat pale at the basis; antennæ very short, three or four basal joints yellowish, the remainder brownish; joints from the fourth to the tenth short, crowded, gradually attenuated towards the tip, where they have very long verticils. Thorax grayish above, with three brown stripes; the intermediate one broad, bifid posteriorly; pleuræ, scutellum, and metathorax grayish; halteres pale; coxæ pale; feet pale tawny, tips of the femora infuscated; those of the tibiæ and tarsi likewise; spurs at the tip of the tibiæ distinct, of moderate length. Abdomen brown, with a sparse yellowish pubescence; margins of the segments and venter paler. Wings uniformly tinged with yellowish; otherwise hyaline, their surface shining; a narrow, inconspicuous brown cloud along the central cross-veins; similar clouds at the origin of the præfurca, the marginal cross-vein, and the tip of the auxiliary vein; stigma pale. Subcostal cross-vein anterior to the origin of the præfurca by not more than one length of the great cross-vein; origin of the præfurca with a stump of a vein; the first submarginal cell is very little shorter than the second, its petiole being very short, sometimes obsolete; the anterior branch of the second vein is arcuated at its basis, as usual; otherwise, the course of both branches of this vein and of the third vein is straight; the discal cell is closed, and the second posterior cell (in the only specimen in my possession) is petiolate.

Hab. Massachusetts (Scudder); a single male.

This species seems to be very like the European *A. occulta* Meig.; only the latter has an open discal cell, and its fourth posterior cell is sessile.

3. A. calcar O. S. ♂ and ♀.—Ochracea, thorace rufescente; alis unicoloribus; cellula submarginalis prima secundâ longior; tibiarum calcaribus longiusculis.

Ochraceous, thorax reddish; wings unicolorous; first submarginal cell

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longer than the second (Tab. II, fig. 14); spurs of the tibiæ rather long. Long. corp. 0.45—0.55.

Syn. *Amalopis calcar* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 247.

Front and vertex grayish; epistoma brownish-gray; palpi yellow at the basis, two last joints infuscated; antennæ yellowish, infuscated at the tip; joints of the flagellum, except the first, short subcylindrical, with short verticils; finely pubescent on the under side. Thorax yellow; four reddish or brownish-red, often indistinct, stripes; halteres pale; coxæ and basis of the femora pale yellow; feet yellowish-brown or brownish-yellow, tip of the tarsi darker; the spurs at the tip of the tibiæ, and especially of the hind ones, are longer than usual in this species, divaricated. Abdomen yellowish at the basis, more brownish towards the tip, especially in the male. Wings hyaline, with a slight yellowish tinge; stigma pale; the distance between the subcostal cross-vein and the origin of the præfurca is about equal to the length of the great cross-vein; the second submarginal cell is shorter than the first; the second posterior cell is usually petiolate; discal cell generally closed (the venation is represented, Tab. II, fig. 14).

Hab. Massachusetts; Upper Wisconsin River; White Mountains, N. H., where I found it in abundance in June. It seems to be a rather northern species, as I never found it near Washington.

4. **A. hyperborea** O. S. ♂.—Fusca, alis fusco-maculatis; venulâ supernumerariâ transversâ in cellulâ basali secundâ; cellula submarginalis prima secundâ longior.

Brown, wings spotted with brown; a supernumerary cross-vein in the middle of the second basal cell; the first submarginal cell is longer than the second. Long. corp. 0.45.

Syn. *Amalopis hyperborea* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1861, p. 292.

The only specimen in my possession being spoiled by mould, the following description is somewhat incomplete:—

Body brownish, antennæ brown; feet brownish, basis of the femora paler, tip of the femora and of the tibiæ infuscated; tarsi dark brown towards the end; halteres infuscated in the middle; their basis, and the greater part of the knob yellow. Second submarginal cell much shorter than the first, its petiole being comparatively long, but little shorter than the præfurca; the latter is comparatively short, strongly arcuated at the basis, and with

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an oblique stump of a vein; subcostal cross-vein anterior to the origin of the præfurca by about four lengths of the great cross-vein; the fourth posterior cell has its inner end a little before the middle of the discal cell; a supernumerary cross-vein in the middle of the second basal cell. Wings rather broad, with a slight brownish-yellow tinge and numerous brown spots; there are seven larger spots along the anterior margin (one at the humeral cross-vein, another a little beyond it, a third at the subcostal cross-vein, a large spot at the origin of the præfurca, the following three at the tips of the auxiliary, first and second longitudinal veins); similar, but smaller spots at the tips of the veins along the posterior margin, beginning with the posterior end of the fork inclosing the second posterior cell; brown clouds in the axillary and spurious cells, near the posterior margin; a spot at the inner end of the second basal cell; cross-veins and inner ends of the forks clouded with brown; the middle of the second submarginal cell clouded.

Hab. Labrador; a single male.

Observation. In reading over the descriptions of the *Limnobiæ* in Prof. Zetterstedt's *Diptera Scandinaviæ*, Vol. X, with the view of locating as much as possible all the anomalous species, I notice the description of *Limnobia varinervis* Zett. (l. c. p. 3813), from Norway, which agrees in many points with *A. hyperborea*. It is certainly an *Amalopis*, and possibly the same species as *A. hyperborea*. *A. varinervis* has the discal cell quite often open.

5. A. vernalis O. S. ♂ and ♀.—Fuscana, alis fusco-maculatis; cellula submarginalis prima secundâ longior; cellula posterior quarta longa, sessilis.

Brownish, wings with brown spots; the first submarginal cell is longer than the second; fourth posterior cell long, sessile. Long. corp. 0.3—0.4.

Syn. *Amalopis vernalis* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1861, p. 291.

Head brownish-gray, front somewhat infuscated in the middle, palpi brown; antennæ not much longer than the head, brown, two basal joints paler; flagellum stout at the basis, joints very short, their pubescence short. Thorax grayish-yellow above, with four brown stripes; the intermediate ones separated by a delicate line; pleuræ and metathorax brown, with a grayish bloom; halteres pale, the middle of the stem, and the basis of the knob infuscated.

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Abdomen brown, lateral and posterior margins of the segments pale; male forceps and the basis of the ovipositor yellowish. Feet brownish, pale at the basis; spurs at the tip of the tibiæ very small. Wings faintly tinged with brownish; six or seven pale brown clouds along the anterior margin, and smaller clouds at the tips of the veins along the posterior margin; cross-veins and inner ends of the forks likewise clouded. The most striking feature of the venation is the length of the fourth posterior cell, the inner end of which is in one line with the inner ends of the fifth posterior and of the discal cell; the second submarginal cell is shorter than the first; the petiole of the former is not half so long as the præfurca; the origin of the præfurca has a stump of a vein; the second posterior cell is usually sessile, sometimes petiolate; the subcostal cross-vein is anterior to the origin of the præfurca by three or four lengths of the great cross-vein.

Hab. White Mountains, N. H., in June; Washington, D. C., early in the spring.

Gen. XXXVI. PEDICIA.

Two submarginal cells; five posterior cells; discal cell closed; the subcostal cross-vein is nearly opposite or a short distance before the origin of the second longitudinal vein, but a long distance before the tip of the auxiliary vein; the first submarginal cell is longer than the second; the central cross-veins run in a very oblique direction, almost parallel to the posterior margin; the latter is somewhat sinuated in the male, near the apex of the wing, which is thus drawn out in a point, instead of being rounded, as usual. Tibiæ with spurs at the tip; empodia distinct; ungues smooth. Eyes pubescent;[1] front with a small gibbosity; the antennæ 16-jointed, short. Male forceps somewhat club-shaped, with large horny appendages.

This genus is very closely allied to *Amalopis*, and besides the larger size and the striking coloring, which give it a peculiarly distinguished aspect, I can discover only the following differences: 1. The last joint of the palpi is flagelliform, and from once and a quarter to once and a half the length of the three preceding joints taken together (in the species of *Amalopis*, which I have observed when alive, the last joint was less in length than the two preceding taken together). 2. The central cross-veins (in this case the small and the great cross-vein, and, between them, the cross-vein forming the inner end of the discal cell) are in a straight

[1] The pubescence is often rubbed off in dry specimens.

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line which runs more obliquely than in any species of *Amalopis*, and if prolonged, would form a very acute angle with the line of the anterior margin; in *Amalopis* the line of the central cross-veins is nearly at right angles with the anterior margin, or at least at a much less acute angle. 3. The posterior margin of the wing is somewhat excised towards the apex in such a manner that the wing is not rounded at the tip, but somewhat pointed, the point being directed backwards; this character belongs to the male sex only; in the female the apex of the wing is rounded, as usual. 4. The wings are kept divaricate, when in repose, whereas the species of *Amalopis* usually fold them.

These characters are barely sufficient to establish a claim to generic separation, and the genus *Pedicia*, defined in such a manner as to include all the species of *Amalopis*, would not have been an unnatural one.

The forceps of the male, built upon the same plan as that of *Amalopis*, has large, horny appendages, projecting in a curved point above; the ovipositor is comparatively short, moderately broad at the basis, pointed at the tip; the shorter lower valves have, on the inside, a fringe of recumbent, strong bristles.

A single European and a single North American species of *Pedicia* are known, and both are so much alike that it requires a close comparison to distinguish them. *P. contermina* Walk., from Nova Scotia, is very probably only a variety of *P. albivitta; P. rivosa* shows occasionally the same abnormity. *P. gracilis* Walker (*List*, etc. I, p. 37), from an unknown locality, seems to be a distinct species.

Pedicia inhabits marshy woods; Dr. Schiner (*Fauna Austr. Dipt.* II, p. 527) observed it also in mountainous regions upon willow trees, so high that the net could not reach them. The larva has been observed by Scheffer, in well-water (Rossi, *System. Verz.* etc. p. 9).

This genus was first introduced by Latreille, in 1809 (*Genera Crust. et Insector.* Vol. IV, p. 255), who placed it among the *Tipulidæ longipalpi*. The relationship of *Pedicia* and *Amalopis* has been first pointed out by me in *Proc. Acad. Nat. Sci. Philad.* 1859, p. 246.

The name may perhaps be derived from πεδίον, a field.

Observation. In two male specimens of *P. albivitta* which I have before me, I perceive something very like a pair of ocelli on

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the front, very near the basis of the antennæ. I do not see them, however, on the front of a female *P. rivosa*, which I can likewise compare. This may be owing to shrinkage. *Pedicia* and *Trichocera* would thus afford the only known instances of ocelli among the *Tipulidæ*.

1. P. albivitta Walk. ♂ and ♀.—Alis hyalinis, costâ, venâ longitudinali quintâ et venulis transversis centralibus fusco-marginatis.

Wings hyaline; the costa, the fifth longitudinal vein, and the central cross-veins margined with brown. Long. corp. 1.2—1.4.

Syn. *Pedicia albivitta* Walker, List, etc. Vol. I, p. 37.—O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 248.

Head and palpi brown, the former with a grayish bloom; antennæ not much longer than the head, yellowish-brown; flagellum stout at the basis, gradually attenuated. Thorax pale brown, with a silvery gray reflection; a brown double stripe in the middle above, and less distinct stripes on the sides; another brown stripe runs from the collare to the root of the wings, and from there to the hind coxæ. Abdomen with a row of brown spots on five segments; they are elongated and pointed behind, with a yellowish-red spot at the basis of each; the remaining portion of their intervals is silvery white; venter with a longitudinal brown band, interrupted by a reddish tinge at the incisures of the segments, and somewhat attenuated in the middle of each segment; tip of the abdomen brownish. Feet stout, hairy, femora tawny; their tips brown; tibiæ and tarsi brown. Wings hyaline; a brown band along the costa, another along the fifth longitudinal cell; they coalesce at the inner end of the basal cells, and are connected by a cross-band along the central cross-vein; the band along the costa is yellowish in the costal cell, and somewhat expanded round the origin of the præfurca.

Hab. Trenton Falls, N. Y.; New London, Conn.; Massachusetts (Mr. Scudder). This species seems to be chiefly northern; I have seen a specimen, however, which was said to have been caught in Maryland.

At first sight, this species looks very like the European *P. rivosa* L.; still the longitudinal brown band along the abdomen, in the latter, seems to be more continuous, and not composed of a series of spots. A careful comparison of a larger number of

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specimens would probably disclose some other differences. The picture of the wings is the same.

Gen. XXXVII. ULA.

Two submarginal cells; four posterior cells; a discal cell; the subcostal cross-vein is a considerable distance anterior to the origin of the second vein; the latter is near the middle of the length of the wing. *Whole surface of the wing finely pubescent.* Tibiæ with distinct spurs; empodia distinct. Eyes pubescent; no striking gibbosity on the front; antennæ 17-jointed; first joint unusually short.

The eyes are remote, being separated on the upper side of the head by a rather broad front; on the under side they are contiguous; the front, even in fresh specimens, does not show the gibbosity visible in the other genera of *Amalopina*. Rostrum somewhat prolonged, cylindrical, but shorter than the head; palpi elongated, slender; last joint elongated, but not strikingly prolonged. Antennæ 17-jointed (I have counted the joints of a fresh specimen of *Ula elegans*, ♀); they are comparatively longer than those of *Amalopis* and *Pedicia*, and, if bent backwards, would reach the root of the wings, even in female specimens; the first joint is remarkably short (the fresh specimen of *U. elegans*, ♀, observed by me, had this joint shorter than the second, difficult to perceive on account of its smallness); the joints of the flagellum are elongated, subcylindrical, clothed on the under side with a distinct pubescence, more dense in the male, and provided with moderately long verticils. The collare is moderately developed; thoracic suture well marked; the depression between it and the scutellum shallow. Feet of moderate length, finely pubescent; fore tarsi a little longer, hind tarsi a little shorter than the corresponding tibiæ; the spurs of the latter are small, but distinct; empodia rather large. The wings are finely and evenly pubescent on the whole surface; those of the female are broader than those of the male. The subcostal cross-vein is placed before the middle of the length of the wing, at more or less distance from the origin of the second longitudinal vein, and nearer to the root of the wing than the tip of the seventh longitudinal vein; the origin of the second vein is near the middle of the wing, a little more distant from the root of the wing than the tip of the seventh longitudinal vein; præfurca comparatively long (much longer than in *Dicranota* and the two genera allied to it), angular, and often with a

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stump of a vein near the basis; the remainder of its course perfectly straight; the small cross-vein is opposite the tip of the sixth vein; the second submarginal cell is of the same length with the first posterior cell, or very nearly so; its basis is pointed; the first submarginal cell is a little shorter than the second, its petiole being as long as the great cross-vein, or a little shorter; the course of the veins, bordering these cells, is almost straight; the marginal cross-vein is very near the tip of the first longitudinal vein, which is nearly opposite the tip of the last branch of the fourth longitudinal vein; the tip of the auxiliary vein is nearly opposite the basis of the first submarginal cell. The discal cell is moderately elongated; narrower at the basis than towards the tip; the second and third posterior cells of nearly equal length; the great cross-vein somewhat beyond the basis of the discal cell; fifth longitudinal vein gently arcuated near the tip; sixth and seventh nearly straight. Abdomen of the male subclavate at the tip; the forceps has a pair of large horny appendages, very well perceptible even in dry specimens (I have not examined it in living specimens); female ovipositor rather short, arcuated, pointed, moderately broad.

Ula is easily distinguished from all the *Amalopina* by its pubescent wings. The presence of only four posterior cells, the shortness of the first submarginal cell in comparison to the second, and the length of the antennæ distinguish it from *Pedicia* and *Amalopis;* the constant presence of a discal cell, the length of the præfurca, and the number of joints of the antennæ separate it from *Dicranota* and the two genera related to it.

Besides the two North American species described below, there are two or three European ones; the European *Ula pilosa* Stan. is very like the North American *U. paupera;* and there exists an undescribed European species closely resembling *U. elegans.* The two species referred by Mr. Schiner to this genus: *sororcula* Zett. and *pilicornis* Zett. (*Dipt. Scand.* X, p. 3885 and 3888), I do not know; but as Mr. Zetterstedt distinctly mentions, in the description of his *Limnobia pilicornis,* that the subcostal cross-vein is at the tip of the auxiliary vein (the expression: "nervus longitudinalis primus apice bifidus," in that author's terminology, means nothing else), this species cannot well be *Ula.* It is more probably an *Ulomorpha. Ula* has also been discovered in amber; *Haploneura hirtipennis* Loew (*Bernstein u. Bernsteinfauna*),

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of which I have seen the original specimen, is undoubtedly an *Ula*.

The genus *Ula* (from οὖλος, soft) was first introduced by Mr. Haliday, in 1833 (*Entom. Magaz.* I, p. 153), for *U. pilosa* Stan. (*U. mollissima* Hal.). Macquart took this species for a *Cylindrotoma* (*C. macroptera* Macq.; compare, however, about this synonymy, the remark under the head of the *Cylindrotomina* below). Mr. Lioy, overlooking the existence of the genus *Ula*, established for this species the genus *Macroptera* (Lioy, *Atti Inst. Ven.* 3d ser. 1863, Vol. IX, p. 224). The position of *Ula* among the *Amalopina* (*Pediciæformia* olim), based upon the pubescence of its eyes, the position of the subcostal cross-vein, etc., has been pointed out by me in 1859 (*Proc. Acad. Nat. Sci. Philad.* 1859, p. 199).

The larvæ inhabit fungi, and have been observed by Stannius (*Beitr. z. Entom. Schl.* p. 205) and Perris (*Ann. Soc. Entom. de France*, 1849, p. 331, Tab. VII, fig. 4). Stannius, who found the larva of *Ula pilosa* in an *Agaricus*, merely says that it is very like that of *Limnobia xanthoptera* (compare above, p. 86). Perris found the same larva in *Hydnum erinaceum*. According to his account it has along the sides short, erect reddish hairs; in other respects, its characters seem to agree exactly with those of the other tipulideous larvæ. The pupa state was assumed underground.

1. U. elegans, n. sp. ♀.—Cinerea, abdomine fusco; alis fusco-maculatis.

Grayish; abdomen brownish; wings spotted with brown. Long. corp. 0.26.

Head gray, palpi brown; antennæ brown, paler at the base. The black ground-color of the thorax above is entirely concealed under a thick gray bloom; stripes hardly perceptible; pleuræ slightly hoary. Halteres yellowish. Abdomen pale brown; last segment paler; ovipositor short, broad, curved. Feet brownish, darker towards the end. Wings with a brown spot on the origin of the præfurca, a brown band between the costa and the fifth vein, along the central cross-veins; brown clouds at the tip of the first longitudinal vein and at the inner end of the second and third posterior cells; fifth longitudinal cell margined with brown, especially towards the tip.

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Hab. White Mountains, N. H.; a single female; July, 1863.

I have seen an undescribed European species, which is very like *U. elegans*, perhaps identical with it.

2. U. paupera O. S. ♀.—Pallide fuscana, fronte cinerea, alis immaculatis.

Pale brownish, front gray, wings immaculate. Long. corp. about 0.3.

Syn. *Ula pilosa* O. Sacken (non Schum.), Proc. Ac. Nat. Sc. Phil. 1859, p. 251.

Front and vertex grayish; rostrum yellowish; palpi and antennæ brown; the two basal joints of the latter yellowish; the third joint is longer than the two first taken together, nearly cylindrical; the following joints are not much shorter than the third, but gradually diminish in length towards the tip of the antenna; the flagellum is clothed on the under side with a delicate pubescence; the verticils are of moderate length. Thorax brownish-yellow, the mesonotum is brownish in the middle, somewhat shining, although covered with a yellowish bloom; pleuræ paler, with a slight hoary bloom; halteres pale, knob infuscated at the tip; feet tawny, infuscated at the tips of the femora, of the tibiæ, and of the tarsi; coxæ and basis of the femora paler. Abdomen brownish, venter paler; ovipositor falciform, short, ferruginous. Wings with a faint brownish tinge, finely, densely, and uniformly pilose over the whole surface; stigma elliptical, but little darker in color than the wing itself; a very faint brownish cloud on the small cross-vein.

Hab. Washington, D. C., a single female.

In my former publication, I had identified this specimen with *Ula pilosa* Schum.; I prefer to give it another name now, as experience has taught me since that such an identification, based upon a description and not upon an actual comparison of specimens, is not always safe.

I possess a male specimen from the Trenton Falls, N. Y., the antennæ of which have a different structure: the joints of the flagellum are much shorter, elongated-elliptical, rather than cylindrical; those of the latter part of the flagellum are longer and more slender than those near its basis; the thorax is dark brown above, covered with a grayish dust; the forceps of the male has large horny appendages, yellow, brown at the tip; the stigma is

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darker at both ends than in the middle. In other respects the resemblance between this specimen and *U. paupera* is very great.

Gen. XXXVIII. DICRANOTA.

Two submarginal cells; four or five posterior cells: discal cell open (adventitiously closed in abnormal specimens); *there are two marginal cross-veins* between the first and the second longitudinal veins; the subcostal cross-vein is a considerable distance before the origin of the second longitudinal vein (Tab. II, fig. 16). Tibiæ with small but distinct spurs at the tip; empodia distinct. Eyes pubescent; distinct gibbosity on the front, behind the antennæ; the latter 13-jointed.

The eyes are remote, being separated on the upper side of the head by a rather broad front; the latter shows in fresh specimens a distinct gibbosity behind the antennæ,[1] which seems to shrink in dry specimens. Rostrum and proboscis short; palpi short. Antennæ 13-jointed; the structure of those of the European species is thus characterized by Mr. Haliday (Walker, *Ins. Brit. Diptera*, Vol. III, p. 307): "*Male:* Antennæ a little longer than the thorax; third and following joints oval. *Fem:* Antennæ submoniliform, a little shorter than the thorax." In the North American *D. rivularis* the antennæ of both sexes are very similar in structure; if bent backwards, they would not reach much beyond the collare; first joint subcylindrical, the second short, cyathiform, the third obconical, attenuated at the basis; the following joints subglobular, gradually becoming narrower towards the tip; the flagellum is clothed with some short, scattered hairs, which can hardly be called verticils, and I do not perceive the delicate pubescence, often occurring in males of *Tipulidæ*.

The antennæ of the male of *D. eucera* are of an entirely different structure; they are twice the length of head and thorax taken together; the flagellum is clothed with a dense, delicate pubescence, without any verticils; the joints are cylindrical, elongated, of nearly equal length, except the last, which is shorter. The head is rather closely applied to the well-developed collare; the thoracic suture is well marked. The feet are long, moderately strong; the spurs at the tip of the tibiæ, although short, are very distinct. The wings have *four* posterior cells in two European

[1] This statement is repeated from *Proc. Acad. Nat. Sci. Philad.* 1859, p. 249, as I have not had any opportunity of seeing fresh specimens since.

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species (*D. pavida* Hal. and *guerinii* Zett., which, however, may be synonyms; compare Walker, l. c. p. 306, No. 1), as well as in the two North American species described by me; they have *five* posterior cells in two European species (*D. ruficornis* Schum. and *D. bimaculata* Schum). The discal cell is open in normal specimens; it is, however, adventitiously closed in some rare specimens of the North American *D. rivularis;* the same seems occasionally to take place among the European species (compare Schiner, *Ins. Austr. Diptera*, II, p. 530, where the author, speaking of the discal cell, always takes care to say "usually" absent). In other respects, the venation is the following (compare Tab. II, f. 16, wing of *D. rivularis*, ♀): the subcostal cross-vein is about the middle of the length of the wing or a little before it, at a distance from the origin of the second longitudinal vein which is somewhat variable in different specimens, but always equal to several lengths of the great cross-vein; the origin of the second longitudinal vein is a little nearer to the root of the wing than is the tip of the sixth longitudinal vein; the præfurca is very short and arcuated. The small cross-vein is opposite the tip of the sixth vein; the second submarginal cell is almost of the same length with the first posterior cell; the first submarginal cell is but little shorter than the second, as its petiole is very short; the course of the veins, bordering these cells, is nearly straight; there are two marginal cross-veins; one very nearly at the tip of the first longitudinal vein; the other not far from the origin of the anterior branch of the second vein; the stigma is between them. The anterior fork of the fourth vein, when present (in the species with five posterior cells), is always very short; the fork of the posterior branch of the fourth vein is nearly twice its length; the great cross-vein is at the same distance from the root of the wing as the small cross-vein; the fifth longitudinal vein is gently arcuated towards the tip; the sixth and seventh are nearly straight. The European species, judging by the existing figures, in all respects agree in the venation with the American ones (compare the figures of the wing of *D. pavida*, in Walker, l. c. Tab. XXX, fig. 7 *a*, *D. bimaculata*, ibid. fig. 7 *b*); *D. ruficornis* Schum., if the figure is correct (Schum. *Beitr.* etc. Tab. IV, fig. 2), has both the præfurca and the anterior fork of the fourth vein much longer than the other species. The wings of the females are distinctly broader than those of the males.

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Abdomen of the male depressed, subclavate at the tip; the male forceps is analogous to that of *Amalopis* and *Pedicia* in structure;[1] abdomen of the female more cylindrical; upper valves somewhat arcuated, moderately long and broad.

Dicranota is closely allied to *Rhaphidolabis* and *Plectromyia* by its 13-jointed antennæ and its venation; but it is sufficiently distinguished by the presence of two marginal cross-veins. While the only known species of *Plectromyia* has four posterior cells and the two species of *Rhaphidolabis* five, *Dicranota* has some species with four and others with five posterior cells. In all other respects, the similitude of the venation of these three genera, which extends to all the relative proportions of cells and veins, is very striking and indicates the closest relationship.

Two North American species are described by me. The four European species have been sufficiently adverted to above, and I am not aware of any other species of this genus ever having been published, unless it is *Limnobia stigmatella* Zett. (compare the foot-note below), which may be a *Dicranota*.

The genus *Dicranota* was first proposed by Mr. Zetterstedt for his *D. guerini*, in 1840 (*Insecta Lapponica*, p. 851); but that this author did not recognize the true character of the genus appears from the fact that even in his later work *D. bimaculata* Schum. is left by him in the genus *Limnobia* (Zett. *Dipt. Scand.* X, p. 3897, 72).[2] Mr. Haliday, in Walker's often quoted work, puts three species under the head of *Dicranota: pavida* Hal. (syn. *guerini*?), *bimaculata* Schum., and *senilis* Hal. The latter, as I have already shown, in 1859, can hardly be a *Dicranota*, nor can it belong to the *Amalopina*, if Mr. Westwood's figure (Walker, l. c. Tab. XXVII, fig. 3) is correct: the subcostal cross-vein is posterior to the origin of the second longitudinal vein; there is only one marginal cross-vein, and the discal cell is present. The wings are those of *Limnophila*, but if the antennæ are really 13-jointed, it is difficult to decide where this species belongs to. In 1859 (*Proc. Acad. Nat. Sci. Philad.* p. 249) I described the first North American species of *Dicranota*, and completed the definition of the genus by noticing its pubescent

[1] This is repeated from *Proc. Acad. Nat. Sci. Philad.* 1859, p. 249; I have not had any fresh specimens for examination since.

[2] In the same work, Vol. X, p. 3843, there is a *Limnobia stigmatella* Zett., from Lapland, which seems to be a *Dicranota* with five posterior cells.

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eyes, the position of the subcostal cross-vein, etc., and assigning it its true place among the *Amalopina* (*Pediciformia*, olim).

The name of the genus is derived from δίκρανον, fork.

Description of the species.

1. D. rivularis O. S. ♂ and ♀.—Obscure cinerea, thorace vittis fuscis; halteribus pallidis; antennis maris brevibus; cellulis posterioribus quatuor.

Dark gray, thorax with brown stripes, halteres pale; antennæ of the male short; four posterior cells. Long. corp. 0.28—0.3.

Syn. *Dicranota rivularis* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 249.

Head dark yellowish-gray, front and vertex slightly brownish; rostrum, palpi, and antennæ blackish; the latter short in both sexes, not reaching the base of the wings; joints of the flagellum subglobular. Thorax dark gray, with three distinct blackish-brown stripes; the intermediate one broad, and, in some specimens, distinctly divided by a longitudinal paler line; scutellum and metathorax dark gray, the posterior half of the latter blackish; halteres pale; coxæ gray, feet blackish, trochanters and basis of the femora paler. Abdomen blackish cinereous, indistinctly whitish along the lateral margins; male genitals gray. Wings (Tab. II, fig. 16, wing of the female) slightly tinged with gray; stigma indistinct, situated between the two marginal cross-veins; præfurca very short, and hence the distance between its origin and the nearest marginal cross-vein is not longer (usually shorter) than the interval between the two cross-veins.

Hab. Washington, D. C.; five males and two females were caught, early in April, in the act of flying close to the surface of a little stream in the woods; the females were in copulation.

One of the males has the discal cell closed on both wings; some of the specimens have a stump of a vein on the præfurca.

2. D. eucera, n. sp. ♂.—Obscure cinerea, thorace vittis fuscis; halteribus infuscatis; antennæ maris thorace multo longiores; cellulis posterioribus quatuor.

Dark gray, thorax with brown stripes; halteres with an infuscated knob; antennæ of the male much longer than the thorax; four posterior cells. Long. corp. 0.26.

Very like the preceding species, and distinguished principally by the structure of the antennæ of the male, which are twice as

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long as the head and thorax taken together, the flagellum with nearly cylindrical, elongated, densely pubescent joints, of nearly equal length, except the last, which is shorter. The knob of the halteres is distinctly infuscated; the stigma, likewise, is slightly brownish; the vertex seems to be darker than in *D. rivularis;* the wings of the male are somewhat narrower, and the præfurca a little longer; the interval between its origin and the nearest marginal cross-vein, in both specimens which I have before me, is longer than the interval between the two cross-veins.

I have two males in my possession, taken together with the specimens of *D. rivularis.* At that time (compare *Proc. Acad. Nat. Sci. Philad.* 1859, p. 250) I was uncertain whether they did not belong to the latter species. I venture now to describe them as distinct; the antennæ are of a length which is otherwise unusual in the genus.

Gen. XXXIX. PLECTROMYIA.

Two submarginal cells; *four posterior cells;* discal cell open; the subcostal cross-vein is a considerable distance before the origin of the second longitudinal vein; the marginal cross-vein is very near the tip of the first longitudinal vein (Tab. II, fig. 18). Tibiæ with exceedingly minute spurs at the tip; empodia small, but distinct. Eyes pubescent; antennæ 13-jointed. The upper horny appendage of the forceps of the male is flat, rounded, with a serrate edge.

A rather broad front separates the eyes above; in well preserved dry specimens, it rises abruptly above the antennæ and is rather convex, without showing any trace of a bump (having neglected to describe it from a fresh specimen, I have abstained from any statement about it in the generic character). Rostrum short; palpi short; the first joint is the longest, the others stout, short; the last is not much longer than it is broad. Antennæ 13-jointed (I have counted the joints on fresh specimens); first joint elongated, subcylindrical; the joints of the flagellum, except the first, which is subconical, are rounded, slightly elongated, with short verticils; they are clothed with a short pubescence, which is more dense in the male; if bent backwards, the antennæ would not reach the root of the wings. Collare well developed, with a short, neck-like prolongation towards the head; the metanotum moderately gibbose above it; thoracic suture well marked. The feet are long (although much shorter than in *Rhaphidolabis*);

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the spurs are so minute as to be perceptible only with great difficulty; the ungues are very minute; the empodia distinct; the first joint of the tarsi is about equal in length to the tibia, or even longer (on the foremost pair of the feet); the four following joints, taken together, are a little longer than half the length of the first joint. The wings (Tab. II, fig. 18) are moderately broad; the subcostal cross-vein is a little before the middle of length of the wing, at a distance before the origin of the second longitudinal vein equal to about two lengths of the great cross-vein; the origin of the second longitudinal vein is a little nearer to the root of the wing than is the tip of the sixth longitudinal vein; the præfurca is comparatively short and arcuated. The small cross-vein is opposite the tip of the sixth vein; the second submarginal cell is of the same length with the first posterior cell; the first submarginal cell is only a trifle shorter than the second, as its petiole is short and in some specimens almost imperceptible; the course of the veins, bordering these cells, is straight, only the anterior branch of the second longitudinal vein is somewhat arcuated; the marginal cross-vein is at the very tip of the first longitudinal vein, which tip is nearly opposite the tip of the second branch of the fourth longitudinal vein; the posterior branch of the latter vein alone is forked, and hence there are only four posterior cells; the second of these (confluent with the discal cell, which is open) has its basis on the same line with the small cross-vein; the third posterior cell is much shorter; the great cross-vein is about the middle of the distance between the bases of the second and third posterior cells, or a little before this middle; the fifth longitudinal vein is gently arcuated towards its end; the sixth and seventh are straight. The abdomen is short and comparatively stout; the male genitals are conspicuously club-shaped; the forceps consists of a pair of subcylindrical basal pieces, with two horny appendages upon each; the upper or outer ones among these are rounded at the end, densely and sharply serrated along the edge of the rounded part, thus looking like the end of a spur; the lower or inner appendage is more slender. The ovipositor of the female is comparatively long, moderately broad, arcuated.

This genus, described here for the first time,[1] is very closely

[1] It was merely mentioned, without any description, in the synoptical table of the genera which I gave in the *Proc. Entom. Soc. Philad.* 1865, p.

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allied to *Rhaphidolabis*, but the body is less slender, the male genitals not club-shaped and of a different structure; the feet comparatively much shorter. The venation is pretty much the same in both genera, as the comparison of the descriptions will show, except that *Plectromyia* has only four posterior cells, and that the subcostal cross-vein is less near the root of the wing. The discal cell is absent in all my specimens.

The name of the genus is derived from πλῆκτρον, spur, and μυῖα, fly, in allusion to the shape of the appendage of the forceps.

Description of the species.

1. P. modesta, n. sp. ♂ and ♀.—Fuscano-ochracea, thorace vittis subobsoletis, capite cano pollinoso, abdomine fusco; alis hyalinis immaculatis.

Brownish-ochraceous, thorax with indistinct stripes, head with a hoary bloom; abdomen brown, wings hyaline, immaculate. Long. corp. 0.17—0.18.

Ground color of the head brown, entirely concealed above by a thick hoary bloom; rostrum somewhat paler; palpi and antennæ brown. Thorax brownish-ochraceous, hardly shining above, in consequence of a dull grayish dust; three pale brown, rather indistinct stripes; the intermediate one double; stem of the halteres pale, the knob brownish; feet tawny, coxæ and basis of the femora paler, tip of the tibiæ and the tarsi brown. Abdomen brown; genitals paler. Wings hyaline, immaculate; veins brown.

Hab. White Mountains, N. H., June, 1864; five specimens.

Gen. XL. RHAPHIDOLABIS.

Two submarginal cells; *five posterior cells;* discal cell closed or open; the subcostal cross-vein is a considerable distance before the origin of the second longitudinal vein; the marginal cross-vein is very near the tip of the first longitudinal vein (Tab. II, fig. 17, wing of *R. tenuipes*). Feet long, slender; tibiæ with minute spurs at the tip; empodia small, but distinct. Eyes pubescent; the front with a bump; antennæ 13-jointed. The forceps of the male of *R. tenuipes* has long, needle-like, horny appendages.

As I have taken some notes from a living specimen of *R. tenuipes*, I consider it as the type of the genus. In the following

225. The name *Astrolabis*, which I gave it at that time, I give up as objectionable, and replace it by *Plectromyia*, a name I originally intended to give to the genus now called *Atarba*.

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description, whenever I was not sure whether a character would be likewise applicable to *R. flaveola*, of which I could compare only dry specimens, I have taken care to mention that this character belongs to the typical species.

The eyes are distinctly pubescent, with a rather broad front between them above, and more closely approximated on the under side of the head; seen from the side, the front of *R. tenuipes* shows a distinct bump behind the antennæ, which is much less visible in dry specimens. The rostrum is short; the palpi (*R. tenuipes*) short, joints stout, except the basal one, which is attenuated. Antennæ 13-jointed (I have counted the joints of a fresh specimen of *R. tenuipes*), short; if bent backwards, they would not reach much beyond the collare; joints of the flagellum oblong, clothed in the male (*R. tenuipes*) with a dense, delicate pubescence, and the alternate ones with short verticils. Collare well developed, rather broad, and with a neck-like prolongation towards the head; the mesonotum rather gibbose above it; thoracic suture well marked. The feet are very long and slender (especially in *R. tenuipes*); the spurs are exceedingly short, and may be easily overlooked; the ungues are very minute; the empodia distinct (for the proportions in length of the tibiæ and tarsi, compare the description of the species). The wings (Tab. II, fig. 17, wing of *R. tenuipes*) are a little longer than the body; comparatively narrow in *R. tenuipes;* broader in *R. flaveola;* the tip of the auxiliary vein is almost opposite the tip of the fifth longitudinal vein; the subcostal cross-vein is at one-third of the length of the wing, a considerable distance before the origin of the second vein, and but a little more distant from the root of the wing than the anal angle; the præfurca is comparatively short, and very much arcuated; it is much shorter in *R. tenuipes*, where its origin is nearly opposite the tip of the sixth vein (a little anterior to it); in *R. flaveola* the origin of the second vein is opposite the tip of the seventh vein, and the præfurca is therefore a little longer. The small cross-vein is opposite the tip of the sixth longitudinal vein (*R. tenuipes*), or a little anterior to it (*R. flaveola*); the second submarginal cell is of the same length with the first posterior cell (or only a trifle longer in *R. tenuipes*); the first submarginal cell is a little shorter than the second, its petiole being shorter than the great cross-vein; the course of the veins, bordering these cells, is

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straight, only the anterior branch of the second longitudinal vein is somewhat arcuated (especially in *R. tenuipes*, where the posterior branch is also, but very slightly, arcuated); the marginal cross-vein is very near the tip of the first longitudinal vein (at this very tip in *R. tenuipes*); the tip of the first longitudinal vein is opposite the tip of the third branch of the fourth longitudinal vein. Both branches of the fourth longitudinal vein are forked; the anterior fork is very short, the second posterior cell, which it incloses being about one-third the length of the first posterior cell; the basis of the third posterior cell in *R. tenuipes* (which has no discal cell), is in one line with the small cross-vein, and rather pointed; in *R. flaveola* the third posterior cell is divided in two by the cross-vein, which forms the subtriangular discal cell; the fourth posterior cell is about half the length of the first; the fifth is somewhat longer than the fourth; the great cross-vein is a little beyond the first forking of the fourth longitudinal vein; the fifth, sixth, and seventh longitudinal veins are nearly straight, somewhat, but not conspicuously, arcuated.

The abdomen is elongated and slender; the male genitals rather club-shaped, consisting of the usual basal pieces, with horny appendages; one of the latter, in *R. tenuipes*, is elongated, needle-shaped, and conspicuous in living specimens, although not visible in dry ones;[1] the ovipositor (*R. flaveola*) has rather long, broad, arcuated upper valves, and blunt, without being actually rounded at the tip; the lower valves are shorter, but also rather broad; the ovipositor of *R. tenuipes* is likewise comparatively long, and arcuated, but narrower and more pointed.

This genus, described here for the first time, although it was mentioned by name in the *Proc. Entom. Soc. Philad.* 1865, p. 225, is closely allied to *Plectromyia*, but easily distinguished from it by the greater slenderness of the body and especially of the abdomen, which has the male genitals distinctly club-shaped; by the structure of the male genitals, and by the venation of the wings, which have five, instead of four posterior cells.

Although *R. flaveola* differs from *R. tenuipes* by the presence

[1] I add this detail from memory, as the description of the forceps, taken down from a living specimen, has been lost with my original manuscript. Although I have caught a specimen since, I have omitted to describe its forceps.

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of a discal cell and by its coloring, their relationship in other respects is so great that I have no hesitation in placing them in the same genus. Should a more detailed study of the organization of *R. flaveola* necessitate its separation, *R. tenuipes* should be retained as the type of the genus.

I am not aware of the existence of this genus in any other country.

The name *Rhaphidolabis* is derived from ῥαφίς, needle, and λαβίς, forceps.

Description of the species.

1. R. tenuipes, n. sp. ♂ and ♀.—Fusca, thoracis vittis fuscis; alis immaculatis, cellulâ discoidali nullâ.

Fuscous, thorax with fuscous stripes, wings immaculate; no discal cell. Long. corp. 0.2.

Head blackish-fuscous; front gibbose, somewhat cinereous along the eyes, darker in the middle; antennæ and palpi black. Thorax fuscous, very little shining, and with a slight hoary bloom; stripes dark brown, almost black; the intermediate one cuneiform, the lateral ones prolonged beyond the suture behind; in the darker specimens, the stripes are divided only by a grayish bloom, visible at the humeri, and extending backwards in the shape of a line between the intermediate and the lateral stripes; in paler-colored specimens the stripes are well marked upon a pale brownish yellow ground. Pleuræ, scutellum, and metathorax brownish, more or less mixed with yellow. Halteres infuscated, pale at the base. Abdomen fuscous, with scattered pale hairs; forceps fuscous. Coxæ yellowish, sometimes more or less tinged with brown; feet dark tawny; femora pale at the base. On the foremost pair of feet of the male the first joint of the tarsi is considerably longer than the tibia; the four following joints, taken together, are much less than half the length of the first joint; nearly the same proportions prevail on the two other pairs of feet, only the first tarsal joint is not much longer than the tibia. Wings (Tab. II, fig. 17) with a slight grayish tinge, immaculate, veins brown; stigma long, very slightly tinged with brownish; the præfurca is short, arcuated; its origin is a little before the tip of the sixth longitudinal vein (for the details of the venation compare the generic characters).

Hab. Maryland; Saratoga Springs, N. Y.

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2. R. flaveola, n. sp. ♂ and ♀.—Flava tota; alis immaculatis cellulâ discoidali instructis.

Entirely yellow; wings immaculate, with a discal cell. Long. corp. 0.2.

The whole body, including the feet, is of a pale yellow color; the thorax above, as well as the pleuræ, have a slight hoary bloom; the wings are hyaline, with pale brown veins, except the costa, which is yellowish; the stigma is elongated, colorless; the details of the venation have been given above, in the generic character. The first tarsal joint (in the female specimen) is about equal in length to the tibia; the four following joints, taken together, are rather more than half the length of the first (the feet of the male specimen are broken).

I possess a male, taken by me in Maryland; a female, taken by Mr. Scudder, on Mt. Greylock, Mass., is much paler in coloring, almost whitish, but agrees in all the other characters.

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Section VII. CYLINDROTOMINA.

One submarginal cell; the first longitudinal vein is incurved at the tip towards the second, instead of ending in the costa (exception: *Phalacrocera replicata* Lin., where the first vein takes the usual course); four or five posterior cells; a discal cell. The auxiliary vein is abruptly interrupted, just before the stigma, without ending either in the costa or in the first longitudinal vein. Eyes glabrous. Normal number of the antennal joints sixteen.[1] Tibiæ with spurs at the tip. Empodia distinct. Forceps and ovipositor of a peculiar structure (compare below).

1. Definition and Affinities.

We have here a small, but very remarkable group of species, occupying an isolated and intermediate position between the *Tipulidæ brevipalpi* and *longipalpi*. Their affinity to the former is justified by the following characters: 1. The structure of their palpi, the last joint of which, although somewhat elongated, never has the whiplash shaped appearance peculiar to the *Tip. longipalpi*; 2. The absence of the peculiar fold which, in most of the *Tipulina*, runs across the wing, beginning in the region of the stigma; 3. The length of the inner marginal cell, which, in the majority of *Tipulina*, is much shorter; 4. The shape and position of the penultimate posterior cell, which is situated behind the discal cell, instead of being alongside of it, which is the case among the *Tipulina*; 5. The number of posterior cells which, as a rule, is *four* among the *Cylindrotomina*, five being the exception; whereas *five* is the rule among the *Tipulina*; 6. The number of antennal joints, *sixteen*, is also the prevailing number among the *Tipulidæ brevipalpi*, whereas *thirteen* is the usual number among the *Tipulidæ longipalpi*.

[1] The European authors (Walker, Zetterstedt, etc.) call the antennæ 17-jointed, which may be due to the fact that in dry specimens the prolongation of the last joint looks like an additional one.

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The *Cylindrotomina* possess other characters, however, which are foreign to the *Tip. brevipalpi.*

1. The *Cylindrotomina* have a single submarginal cell and spurs at the tip of the tibiæ. The *Tip. brevipalpi* with a single submarginal cell, as far as known, never have any spurs on the tibiæ.[1] The presence of these spurs is a point of affinity to the *Tipulina.* The divaricated spurs of *Phalacrocera* remind very much of *Tipula.*

2. The course of the veins immediately surrounding the stigma is very peculiar here. The first longitudinal vein, instead of ending in the costa, is incurved towards the second vein, and ends in it (fig. 4). The marginal cross-vein (usually connecting the first and second longitudinal veins and thus dividing the marginal cell in two sections) is absent; instead of it, there is a short, generally oblique and often indistinct cross-vein between the first vein and the costa (fig. 4 *a*); this cross-vein is inserted a short distance anterior to the tip of the first vein. A glance at the venation of a genuine *Tipula* (fig. 6) at once shows its homologies with that of the *Cylindrotomina.*

Fig. 4.

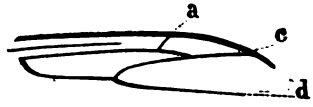


Fig. 5.

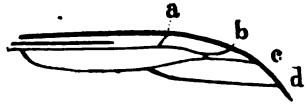
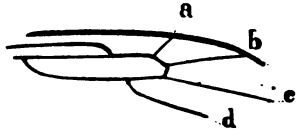


Fig. 6.



In *Tipula* the second longitudinal vein has a short fork (fig. 6, *b*, *c*), which is wanting in the *Cylindrotomina;* the first vein ends in the anterior branch of this fork; the prolongation of this anterior branch, together with a short cross-vein (*a*) between the first vein and the costa (which cross-vein is homologous to the above-mentioned cross-vein of the *Cylindrotomina*) inclose a small trapezoidal cell, very characteristic of the *Tipulina* (fig. 6, between *a* and *b*). To complete the resemblance, it would be necessary for the second vein of the *Cylindrotomina* to emit a short branch; and this is actually the case with the European species *Phalacrocera replicata* (fig. 5), where

[1] Compare the genus *Atarba*, which may be an exception.

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the vein *b* may be considered as homologous to *b*, in fig. *β*, although it appears to be merely the prolongation of the first vein. Thus *Phalacrocera*, the general appearance, antennæ, etc. of which are so much like *Tipula*, seems also to indicate a transition towards this genus in its venation. And that this interpretation of the course of the first vein in *Phalacrocera* is not altogether arbitrary, is proved by the North American *Ph. tipulina*, closely allied to the European species, but in which, nevertheless, the first vein ends in the second, as it does in the other *Cylindrotomina*, and the branch *b* is wanting. But there are a few *Tipul. longipalpi* (for instance *Dolichopeza*) where the second vein has no fork, and then the resemblance to the *Cylindrotomina* in that portion of the venation is complete.

3. In all the specimens which I have had an opportunity to examine, the auxiliary vein does neither join the costa (as in the majority of the *Tip. brevipalpi*), nor the first longitudinal vein (as in the *Tip. longipalpi*), but it stops short abruptly, just before the stigma (compare above, the figures 4 and 5); some distance before its abrupt termination, sometimes close by it, the auxiliary vein is connected with the first longitudinal vein by a short, often indistinct cross-vein. Thus, in this important character, the *Cylindrotomina* hold the middle between the *Tip. longipalpi* and *brevipalpi*.

We may sum up the preceding examination by saying that the *Cylindrotomina*, with all the prevailing characters of the *Tip. brevipalpi*, show important aberrations in the course of the veins in the vicinity of the stigma, aberrations which prove a leaning towards the *Tip. longipalpi*. The latent affinity to the latter is further proved by the presence of spurs on the tibiæ, and by the general appearance; the coloring of the *Cylindrotomina* reminds very much of the two principal genera of the *Tipulina*—*Cylindrotoma* of *Pachyrrhina*, and *Phalacrocera* of *Tipula*.

If I have gone into some detail with regard to the above indicated structural homologies, it is not that I attach an absolute importance to them. New forms may be discovered, which may perhaps overthrow the supposed homologies between the venation of *Cylindrotoma* and *Tipula*: but the perusal of my statements will, I hope, in one way prove useful to those who may have to describe these new forms; it will indicate to them the characters deserving to be mentioned in their descriptions, characters which

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otherwise would probably be overlooked by entomologists who have not made the *Tipulidæ* their especial study.

The structure of both male and female genitals of the *Cylindrotomina* shows some peculiarities which deserve to be noticed.

In the forceps of the male *Cylindrotomina* which I have had an opportunity to examine, the claw-shaped horny appendages inserted at the tip of the movable basal pieces do not meet or overlap each other, as usual. In the state of repose they are folded backwards, like the blade of a penknife, towards the upper side of their basal pieces. A very characteristic, long, horny, linear organ, which I have called *aculeus*, usually protrudes when the forceps is opened, and sometimes remains hanging on the outside even in dry specimens. This organ consists of three slender horny styles, connate at their basis, which is especially the case with *Phalacrocera tipulina;* each of the styles has a knob at the tip in *Cyl. nodicornis* O. S. and in *Triogma;* in *Cylindrotoma americana* these styles are so far connate that the aculeus assumes the shape of a lamella with three sharp points at its tip,[1] separated by deep indentations.

The ovipositor of the female is distinguished by its short, broad, foliaceous valves, rounded at the tip. Nothing similar is to be found among the *Tipulidæ*. The ovipositor of *Cyl. distinctissima* has a still more complicated structure, which will be described in its place.

2. Historical Account.

The history of this group is short, as the recognition of its true characters is only of recent date. The principal European *Cylindrotomina* were known for a long time before any connection was discovered between them, and on the other hand the genus *Cylindrotoma* was first established and long maintained, upon a purely artificial character, which caused many foreign elements to be introduced in it.

The genus *Cylindrotoma* has been adopted by Macquart in 1834 (*Hist. Natur. des Dipt.* Vol. I, p. 107); he formed it out of two European (*distinctissima* and *macroptera*) and a North American

[1] The forceps of the European *Cyl. glabrata* Meig. seems to be built upon a different plan; but I cannot well judge of it from a single dry specimen. The structure of its aculeus, as far as I could perceive, is the same as in *Cyl. nodicornis* O. S.

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species (*macrocera* Say). The first of these three species has remained as the type of the genus; the second, according to the interpretation of Stæger, Loew, and others, is synonymous with *Ula pilosa* Schum.; the third is a *Limnophila*. The only character which has induced Macquart (compare Macq. *Dipt. Exot.* I, p. 67) to separate these species from *Limnobia*, and to place them under a common generic appellation, is the structure of their antennæ, which have elongated, cylindrical joints.[1] In the *Diptères Exotiques* the same author added three more species to the genus, all of which are *Erioceræ*, and have antennæ of an entirely different structure (*acrostacta* Wied., from Java, *rufi-cornis* Macq., and *erythrocephala* Wied., both from Brazil)! This shows the vagueness of Macquart's conception of the genus he was introducing.

Stäger (*Kröjer's Tidskr.* III, p. 36) based his definition of *Cylindrotoma* likewise on the structure of the antennæ.

In 1849 Mr. Loew described *Cylindr. nigriventris* from Siberia. He observes correctly that *C. distinctissima* has to be considered as the type of the genus, and that the two other species, added by Macquart, do not belong to it. Nevertheless, the four species found by the same author in amber and mentioned by him as *Cylindrotomæ* (*Ub. d. Bernstein und die Bernstein-fauna*, 1850), belong all to the genus *Limnophila*.

Mr. Zetterstedt (*Dipt. Scand.* X, p. 3900; 1851) placed *Ula pilosa* in the genus *Cylindrotoma*, together with *C. distinctissima*; at the same time *Triogma exsculpta* and *Phal. replicata* are left among the *Limnobiæ*, although their relationship to *Cylindrotoma* is noticed (l. c. page 3879).

Mr. Haliday (in Walker's *Insecta Britannica, Diptera*, III, p. 312; 1856) gave a detailed account of the generic characters of *Cylindrotoma*, in which the peculiarities of the venation are correctly stated.

This recognition of the true characteristics of *Cylindrotoma* could not be considered as completed as long as this genus was not placed in the same group with *Limnobia trisulcata* and

[1] It is singular that Macquart in characterizing the genus calls the antennæ 13-jointed, whereas the figure he gives of *C. distinctissima* shows 17 joints. His figure of *C. macroptera* shows 13 joints, in conformity to the description, and if this statement is correct, the species cannot be *Ula pilosa*.

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Limnobia replicata Lin. This step was taken by Dr. Schiner (*Wiener Ent. Monatschr.* 1863, and *Fauna Austriaca*, 1864). He pointed out this relationship, proposed for these species the new genera *Triogma* and *Phalacrocera*, and gave to the whole group the name of *Limnobina cylindrotomiformia*.

In 1865 (*Proc. Entom. Soc. Philad.* Vol. IV, p. 224) I described for the first time North American insects of this group; four species, belonging to the three above-named genera. The position assigned to the *Cylindrotomina* in the present publication differs from that which they occupy in Dr. Schiner's work, next to the *Limnobina anomala*. This change of place is intended to indicate the affinities between the *Cylindrotomina* and the *Tipulina;* it has the further advantage of removing the *Cylindrotomina* from among the spurless *Tipulidæ*, and placing them in the midst of those which are provided with spurs.

3. Distribution in Genera.

Dr. Schiner has distributed the European *Cylindrotomina* among three genera: *Triogma*, with one species (*T. trisulcata* Schum.); *Phalacrocera*, with *P. replicata* L., and *Cylindrotoma* with *C. distinctissima* M., *glabrata* M., *nigriventris* Loew, and *diversa* Walk. *C. glabrata*, however, by the structure of its antennæ, of its male forceps, and by its venation, is sufficiently distinct from *C. distinctissima* to be set up as a separate genus. The two remaining species of *Cylindrotoma* I have not seen, but judging from the description of one of them, *C. nigriventris*, it is closely allied to *C. distinctissima*.

Among the North American species we have in *Triogma exsculpta* O. S. a form closely analogous with *T. trisulcata;* in *Cylindrotoma americana* O. S. a form almost identical with *C. distinctissima*. The coloring of *C. nodicornis* O. S. is so much like that of the European *C. glabrata*, that, at first glance, they might be taken for the same species; and one is surprised to find, upon examination, that they show not unimportant differences in the structure of the antennæ, of the male genitals,[1] and in the venation of the wings. The forceps of *C. nodicornis* O. S.,

[1] I have seen but one dry specimen of *C. glabrata*, ♂, and can but imperfectly judge of its forceps. It would be interesting to investigate whether it is really so different from the typical form of the *Cylindrotomina* as it appears to me.

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the absence of the small cross-vein on the wings, and the sculpture of the thorax remind of *Triogma* so much, that before I had seen *C. glabrata*,, I preferred to place *C. nodicornis* in the genus *Triogma*, rather than to connect it with *C. americana* (compare my description of this species in *Proc. Entom. Soc. Philad.* 1865). The fact is that these species represent a gradation which baffles every attempt at a generic arrangement.

The North American *Phalacrocera tipulina* O. S. shows an important difference in the venation from the typical *Phalacrocera*, the European *P. replicata;* but the resemblance in their coloring and general appearance is very great.

In order to avoid the establishment of a new genus for almost every species known, which would probably necessitate a similar process for every species to be discovered hereafter, I have preferred to retain Dr. Schiner's three genera, although since the discovery of the North American species those genera rest more upon the general appearance of the insects than upon characters which admit of a strict definition. Acting upon this principle, I have placed in the genus *Cylindrotoma*, the insect which I had described in 1865 under the name of *Triogma nodicornis*.

4. Larvæ.

The early stages of the *Cylindrotomina* seem to be as anomalous as the structure of the perfect insect. The larva of *C. distinctissima*, instead of being found underground, or in decayed wood or in fungi, like most tipulideous larvæ, assumes the habits and more or less the exterior of a lepidopterous larva, and lives upon the leaves of certain plants. The larva of *Phalacrocera replicata*, still more singular in structure, lives under water, upon water plants (more details about both larvæ will be given below).

5. Geographical Distribution.

Besides the six species from the old world and the four from North America, which have been mentioned on the preceding pages, no other described *Cylindrotomina* can be named here with any degree of certainty. *Cylindrotoma albitarsis*, from Java, described by Doleschall, *Natuurk. Tijdschr. Nederl. Indie*, Vol. XIV, p. 15, Tab. IV, fig. 1, can hardly be a *Cylindrotoma*, and its venation seems to show some analogy to that of *Limnobia trentepohlii* Wied. (*Auss. Zw.* I, p. 551, Tab. VI, *b*, fig. 12), from

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Sumatra. About *Cylindr. ornatissima* Doleschall, from Amboina (l. c. Vol. XVII, p. 80), I have no opinion, and I may say the same about *Cylindr. hyaloptera* Philippi, from Chile (*Verh. Zool. Bot. Ges. in Wien*, 1865, p. 614). The descriptions of both species are too short to enable me to judge whether these species are really *Cylindrotomæ* or not.

Gen. XLI. CYLINDROTOMA.

First longitudinal vein incurved at the tip towards the second and ending in it (and not in the costa); a marginal, a submarginal, a discal, and *five* posterior cells.[1] Antennæ 16-jointed, *joints subcylindrical, elongated;* first joint short, not longer than the second. Eyes bare, separated by a rather broad interval above and below the head. Tibiæ with distinct spurs at the tip. Empodia distinct. Forceps of the male with claw-shaped horny appendages, which, in the state of repose, are folded backwards, like the blade of a penknife, towards the upper side of their basal pieces; a long, narrow, linear lamella, deeply tridentate at the tip, protrudes when the forceps is opened. Coloring yellow, with black stripes and spots.

Head rather broad posteriorly. Proboscis very short; palpi somewhat elongated, last joint elongated; in *C. americana* it is about equal in length to the two preceding joints taken together. The antennæ of the male with elongated, almost cylindrical joints; finely pubescent, with short, thin, rather scattered verticils; those of the female shorter, less pubescent. In both sexes, the first joint is remarkable for its shortness. Collare moderately developed. Thorax short, stout. Feet slender; spurs at the tip of the tibiæ of moderate length; fore coxæ short; empodia distinct; excision at the basis of the last tarsal joint of the male, on the under side, rather small, and this joint not particularly modified. Abdomen long, slender, conspicuously club-shaped at the tip, in the male; the long, narrow, linear, horny lamella, which usually protrudes when the living insect opens its forceps, ends in three sharp points. The ovipositor of the female of *C. distinctissima* has a very peculiar structure. It is rather large; the upper valves are lamelliform towards the tip, and the lower ones are curved in such a manner as to leave a considerable empty space between them and the upper ones. Although I have not seen the female of *C. americana*, I have no doubt, from its close

[1] *Four* in *Cyl. nodicornis* O. S.; it will be explained below, that this generic character applies only to the typical species, *C. distinctissima* and *americana*.

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resemblance to the European species, that the ovipositor has a similar structure. The peculiarities of the venation, compared to that of the other *Tipulidæ*, have been explained in the general remarks on the *Cylindrotomina* (p. 290); the auxiliary vein stops short abruptly, and is somewhat indistinctly connected near its tip with the first longitudinal vein; the latter, instead of ending in the costa, is incurved towards the second longitudinal vein, and ends in it; a more or less indistinct cross-vein connects it with the costa; the second longitudinal vein forms with the third a fork, neither of the branches of which is in a straight line with the præfurca (a different structure of this fork characterizes *Phalacrocera*); the small cross-vein is always present and not rendered obsolete, as in *Triogma*, by the contact of the submarginal with the discal cell; the discal cell is elongated, and its inner end is nearer to the root of the wing than the inner end of the submarginal cell; of the three veins emitted by the discal cell towards the margin of the wing, the anterior one in the European *C. distinctissima* and in *C. americana* has a branch-vein, inclosing one more posterior cell, of which these species have thus *five* instead of *four*. (Judging by Dr. Schiner's expressions about this character, it seems as if it was not altogether constant, and that occasionally specimens of *C. distinctissima* with *four* posterior cells occur; but this must be a very rare exception.)

The generic character, as defined above, applies to the European *C. distinctissima* and the American *C. americana*. *Cylindrotoma glabrata* M. and *nodicornis* O. S. have been included in the genus, in order to avoid the necessity of introducing a new one (compare above, p. 295). They differ from the typical species in the following characters: the first joint of their antennæ has the usual elongated shape, and is distinctly longer than the second; the antennæ of the male are of an entirely different structure; the head is more narrowed posteriorly, the thorax less short and differently sculptured; the tip of the abdomen of *C. nodicornis* O. S. is narrower and less conspicuously club-shaped; the lamella of the forceps consists of three linear, horny styles, connate at their bases, and each with a small knob at the tip; the ovipositor of the female consists of four broad valves, rounded at the tip, and joined to each other without leaving an open interval between them; the discal cell is much shorter, and

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its inner end is farther from the root of the wings than the inner end of the submarginal cell; the small cross-vein, although present in *C. glabrata*, is wanting in the majority of the specimens of *C. nodicornis;* and lastly, there are *four*, instead of *five* posterior cells.

However much *C. glabrata* and *nodicornis* may differ from *Triogma* in their general appearance and in their coloring, they have more affinity to this genus than to the typical *Cylindrotomæ*. This affinity appears: in the structure of the antennæ, the sculpture of the thorax, the shape of the discal cell, the number of posterior cells, the structure of the lamella of the male forceps. The American *C. nodicornis* O. S. differs from *C. glabrata* in having, in normal specimens, the submarginal cell in close contact, at the basis, with the discal cell (Tab. I, fig. 7, wing of *C. nodicornis*), in consequence of which the small cross-vein is wanting. The same is the case with both species of *Triogma*. In the *Proc. Entom. Soc. Philad.* 1865, p. 239, I did not hesitate to locate *C. nodicornis* in the genus *Triogma;* but at that time I had not seen the European *C. glabrata*. It will be necessary ultimately to establish a new genus for these two species (it may be called *Liogma*, from the character of the furrows which are more smooth than those of *Triogma*). But I abstain from characterizing this genus, as I am not quite certain about the position of *C. nigriventris* Loew, and *diversa* Walk., which I have not seen.

The word *Cylindrotoma* is derived from κύλινδρος, cylinder, and τέμνω, I cut, in allusion to the shape of the antennal joints of the typical species.

The larva of *Cylindrotoma distinctissima* lives on the under side of the leaves of different plants, as *Viola*, *Anemone*, *Stellaria*, and eats elongated holes in them; it is green, elongated, flattened, linear, but little attenuated at both ends, with a longitudinal crest along its back, consisting of a row of fleshy processes, pointing backwards; the lateral margin is broad, with many excisions, formed by fleshy points. The larva, before transforming, leaves the plant upon which it fed, and fastens itself to some grass-stalk, upon which it undergoes the pupa state. The pupa is not unlike that of some Lepidoptera; the thorax bears several horny processes. The first description and the only figure of this larva have been given by Schellenberg (*Genres de*

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Mouches Diptères, 1803, Tab. XXVII), a circumstance which has been entirely overlooked since, probably because this author took the insect for a *Pachyrrhina*). Boie (*Krõjer's Tidskr.* II, p. 234; 1838) made a short mention, and Zeller (*Isis*, 1842, p. 808) gave the best description of the larva.

Description of the species.

1. C. americana O. S. ♂.—Flava, capite flavo, thorace nigro-fasciato, antennarum articulis subcylindricis, elongatis; cellulis posterioribus quinque.

Yellow, head yellow, thorax striped with black, antennæ with subcylindrical, elongated joints; five posterior cells. Long. corp. 0.45.

Syn. *Cylindrotoma americana* O. Sacken, Proc. Entom. Soc. Phil. 1865, p. 236.

Head pale yellow, rounded and but little attenuated posteriorly; a pale brown spot on the vertex; palpi brown; the antennæ, if extended backwards, would reach the end of the second abdominal segment; two basal joints pale yellow, the first not much longer than the second; third joint yellow at the extreme basis only, elongated, cylindrical; the following joints brown, a little shorter than the third, elongated, subcylindrical, slightly attenuated at the basis; they are nearly of the same length to the end of the antenna; the flagellum is clothed on both sides with a delicate and dense pubescence, among which some longer, but also very delicate verticils are scattered. Thorax pale yellow, opaque above, with a black, opaque stripe in the middle, reaching from the scutellum to the collare, and divided longitudinally by a very narrow yellow line; the lateral stripes are dark brown, sometimes pale brown, abbreviated anteriorly and reaching beyond the suture posteriorly; a brown spot on the pleuræ, between the root of the wings and the collare and another brown spot on each side of the sternum, between the first and second pair of coxæ; halteres pale, dusky at tip; feet yellow, tarsi brown towards the tip. Abdomen brownish-yellow, darker along the lateral margins; its tip (in the male) is rather stout, club-shaped. Wings hyaline, very slightly tinged with yellowish-cinereous; stigma short, pale; the præfurca and the remaining portion of the second vein are almost of equal length; the first vein ends in the second at about the middle of the outer section of the latter; submarginal cell a little longer than the first pos-

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terior; small cross-vein short; discal cell rather large, elongated; its inner end pointed and nearer to the basis of the wing than the inner end of the submarginal cell; the posterior end of the discal cell emits four veins towards the margin; the anterior among these veins is very arcuated at its basis, so that the cell it forms seems to be carved out of the first posterior cell; great cross-vein somewhat beyond the basis, but before the middle of the discal cell; fifth longitudinal vein incurved at the tip (more structural details about this species have been given among the generic characters).

Hab. White Mountains, N. H., end of June, 1864; two male specimens.

Observation I. I have not seen the female of this species, but I suppose that its antennæ are a little shorter and its wings somewhat smaller; at least these characters distinguish the female of *C. distinctissima.* I suppose also that in the American species, as in the European, the venation may be somewhat variable, and that in some cases the second posterior cell may be petiolate, instead of sessile.

Observation II. I will mention here some peculiarities of the suture of the thorax of this species, which I have omitted in its description, as unimportant for its recognition. The thoracic transverse suture is marked by a very delicate groove in the shape of a Y or of a fork, the two ends of which run parallel towards the collare, and the handle reaches the scutellum; a transverse impression on each side connects this fork with the sides of the thorax, near the root of the wings, and thus completes the transverse suture. These slender grooves on the thoracic dorsum foreshadow the more distinct sculpture of *Triogma.* The scutellum in both genera has two distinct pits near its basis.

Observation III. The European *C. distinctissima* is almost identical with *C. americana.* The three specimens of the former, which I can compare, show the following differences: the dark spot on the head and the stripes of the thorax are not brown, but of an opaque black; there is a black spot, divided in two parts by a fine longitudinal yellow line, on the posterior part of the metathorax (there is no vestige of such a spot in *C. americana*); the feet are also of a darker coloring, and the tips of the femora and of the tibiæ are distinctly infuscated; the wings have a more distinct

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grayish tinge, and the stigma is likewise more distinctly colored. The paleness of my two American specimens may be accidental; still, they would show at least a vestige of the spot on the metathorax, if it occurred in better-colored specimens.

2. C. nodicornis O. S. ♂ and ♀.—Obscure flava, capite nigro, thorace nigro-vittato, antennis moniliformibus, articulis earum brevibus, subcordiformibus; cellulis posterioribus quatuor.

Dark yellow, head black, thorax with black stripes, antennæ moniliform, their joints short, almost heart-shaped; four posterior cells. Long. corp. 0.4—0.42.

Syn. *Triogma nodicornis* O. Sacken, Proc. Entom. Soc. Phil. 1865, p. 239.

Head black, shining; palpi brownish; antennæ dark brown, reaching a little beyond the basis of the abdomen in the male and somewhat shorter in the female; two basal joints and the basis of the third brownish-yellow; first joint cylindrical, of moderate length; the second short; the joints of the flagellum, especially the middle ones, are not much longer than broad, expanded on the under side so as to appear almost heart-shaped, and connected by short pedicels, so as to make the antenna appear moniliform; the last joint is abruptly narrower than the preceding and about twice its length, subcylindrical; it shows a coarctation in the middle, which is more apparent in some (fresh) specimens than in others, and then the antennæ may be taken for 17-jointed; in the female the joints of the flagellum are much less expanded, and only seven or eight intermediate joints have a strikingly heart-shaped appearance; towards the tip, they become gradually narrower; in both sexes, the antennæ are clothed with a soft, dense, pubescence, much denser on the under side, and much more striking in the male than in the female; besides, each joint has several verticils about the middle. Thorax honey-yellow, with three black, shining, often confluent stripes; sternum between the first and second pairs of coxæ, black, shining; this black coloring is extended upwards, across the pleuræ, in the shape of a black, but not shining stripe; a black opaque spot near the base of the halteres, aciculate on its surface; metathorax, or at least its posterior part, black, its surface rugose (very dark specimens, with confluent thoracic stripes, have all these spots and stripes darker and more extended; those specimens, on the contrary, which have the thoracic stripe separated by yellow,

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especially towards the scutellum, have also the other black marks smaller in extent and paler in coloring, often pale brown, and the sternum is black on the sides only, yellow in the middle). A well-marked groove extends from the scutellum along the middle of the intermediate stripe, and is interrupted long before reaching the collare; the intervals between the intermediate and the lateral stripes are rugoso-punctate. Halteres pale, knob dusky. Feet brownish-yellow; tip of the femora, of the tibiæ, and of the two first tarsal joints, infuscated; two or three last tarsal joints brown. Abdomen brownish, last segments darker, venter paler; genitals brownish-yellow. Wings (Tab. I, fig. 7) tinged with brownish-cinereous; stigma elliptical, brownish; submarginal cell longer than the first posterior; discal cell of variable, generally of moderate size, nearly quadrangular; four posterior cells; position of the great cross-vein variable, sometimes a little before, sometimes a little beyond the inner end of the discal cell; the small cross-vein is usually wanting, that is, the inner end of the submarginal cell is more or less contiguous to the inner end of the discal cell; the extent of this contiguity is variable in different specimens; sometimes the small cross-vein is present, but then it is short (among twenty-one specimens which I have compared, only four had the cross-vein); the fifth longitudinal vein is incurved at its tip.

Hab. Washington, D. C.; New York; White Mountains, N. H.; Illinois (LeBaron); New Jersey (Cresson). Not rare in May and June.

The aculeus of the male forceps is very often projecting in the dry specimens of this species. It consists, as observed on p. 292, of three horny, slender styles, connate at the basis, separated and somewhat club-shaped at the tip.

The resemblance between this species and the European *C. glabrata* M. is complete, as far as their coloring is concerned; and it is therefore the more remarkable that they should differ so much in some structural details. The antennæ of the male *C. glabrata* are much shorter; if extended backwards, they would not extend much beyond the roots of the wings; the joints are short subcylindrical, attenuated at the basis. The wings are distinctly longer, and the submarginal cell is not in contact with the discal cell, so that the small cross-vein is present. The

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forceps, as I have already alluded to above (p. 294), seems to have a different structure.

Gen. XLII. TRIOGMA.

First longitudinal vein incurved at the tip towards the second and ending in it (and not in the costa); a marginal, a submarginal, a discal, and four posterior cells; *the small cross-vein is wanting*, the submarginal cell, at its inner end, being in immediate contact with the discal cell. Antennæ 16-jointed; first joint elongated; joints of the flagellum short subcylindrical or subglobular, attenuated at the basis; broader in the male than in the female. Eyes glabrous, separated by a rather broad interval above and below. Tibiæ with distinct spurs at the tip. Empodia distinct. Forceps of the male analogous to that of *Cylindrotoma*; the aculeus is three-branched, the single branches with a knob at the tip. The ovipositor of the female has short, broad valves, obtuse at the tip. Coloring dull brownish or grayish; head and thorax conspicuously sculptured with deep punctures.

Head rather broad posteriorly; proboscis and palpi rather short. The antennæ of the male have more rounded joints of the flagellum than those of the female; they are clothed on the under side with a delicate pubescence; in the female these joints are rather subcylindrical; in both sexes each joint is attenuated at the basis, and there are short verticils about the middle of each (I possess only the male of *T. trisulcata*, and the female of *T. exsculpta*). The collare is moderately developed, in the shape of a transverse fold. The thorax of the two species at present known is sculptured in a manner quite unusual among the *Tipulidæ*, and even among the Diptera in general; there is a more or less distinct groove running from the collare backwards, along the middle of the mesonotum; on each side of it, there is a densely rugoso-punctate stripe; the upper part of the metathorax is also densely rugoso-punctate. Feet rather strong, fore coxæ short, spurs at the tip of the tibiæ of moderate length; empodia large, distinct; last joint of the tarsi in the male only slightly excised at the basis on the under side, and its shape not modified. The forceps of the male is very much like that of *Cylindrotoma*. Although I have not had the opportunity to examine the forceps of living specimens, I could perceive in the dry specimen of a male *T. trisulcata* the presence of a three-branched aculeus, with knobs at the end of the branches, similar

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to that of *Cyl. nodicornis* O. S. The ovipositor of the female has short, broad, obtuse valves.

The principal feature of the venation, the course of the first longitudinal vein, which does not end in the costa, but is incurved at the tip towards the second vein, is the same here as in *Cylindrotoma*. The auxiliary vein ends abruptly at the inner end of the stigma, and has but an indistinct connection with the first longitudinal vein (I perceive this in *T. exsculpta* only). A slight vestige of an oblique cross-vein connects the latter part of the first vein with the costa. The absence of the small cross-vein seems to be a peculiarity of this genus; the inner end of the submarginal cell thus comes in immediate contact with the discal cell.

The relationship of *Triogma* and *Cylindrotoma* is very great, and the principal differences consist in the structure of the antennæ, the number of posterior cells, and the absence of the small cross-vein in the former genus; in the shape and sculpture of head and thorax, and in the general coloring.

This genus was proposed by Dr. Schiner, in 1863, for the European *Limnobia trisulcata* Schum.; the North American species is an exactly analogous form. These two species are the only ones of the genus at present known.

The name of the genus is derived from τρεῖς, three, and ὄγμος, furrow, in allusion to the thoracic furrows.

Description of the species.

1. T. exsculpta O. S. ♀.—Fusca, alis infuscatis; thorace sulco medio impresso; vittis ejus lateralibus, capite metanotique parte anteriori rugoso-punctatis.

Brown, wings tinged with brownish; thorax with an impressed groove in the middle; its lateral stripes, the anterior part of the metathorax, and the head are rugoso-punctate. Long. corp. 0.37.

Syn. *Triogma exsculpta* O. Sacken, Proc. Entom. Soc. Phil. 1865, p. 239.

Whole body dull brown; front and vertex rugoso-punctate, with a longitudinal furrow in the middle; palpi brown; antennæ, basal joints brown, flagellum paler, joints of the latter subovate. Thorax with a deep longitudinal furrow in the middle; the lateral stripes are marked by a deep, irregular punctation; from the anterior part of these rugoso-punctate stripes a similar punctation

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extends backwards, along the sides of the mesonotum; the anterior part of the metathorax is deeply rugoso-punctate, and some parts of the pleuræ are also punctate. Halteres dingy brownish-tawny; coxæ brown, feet tawny, clothed with black hairs. Abdomen brown. An indistinct cross-vein connects the latter part of the first longitudinal vein with the costa; discal cell elongated, quadrangular; stigma indistinct, colorless.

Hab. Pennsylvania (Cresson); a single female specimen.

This species is very like the European *T. trisulcata* in its sculpture, but is manifestly different from it. The coloring of the European species is more blackish than brownish; the hind part of the pleuræ, the anterior part of the metathorax, and the basis of the coxæ are yellow, the antennæ and feet are darker, the stigma is brownish, etc.

Gen. XLIII. PHALACROCERA.

First longitudinal vein incurved at the tip towards the second and ending in it (*P. tipulina*), or ending in the costa and connected with the second by a cross-vein (*P. replicata*); a marginal, a submarginal, a discal, and four posterior cells; the anterior one of the three short veins connecting the discal cell with the margin is arcuated, in consequence of which the first posterior cell is attenuated at the basis (and not square, as usual); a distinct small cross-vein is present. Antennæ 16-jointed; first joint elongated, joints of the flagellum elongated, almost cylindrical, with short verticils. Eyes glabrous, separated by a rather broad interval above and below. Tibiæ with distinct spurs at the tip. Empodia distinct. Forceps of the male analogous to that of *Cylindrotoma*; the aculeus is three-branched, the branches connate at the basis, pointed at the tip; valves of the ovipositor broad. Body brownish, head and thorax grayish, without any conspicuous punctures.

Dr. Schiner established this genus, in 1863, for the European *P. replicata*, which is easily distinguished from all the known *Cylindrotomina* by the course of the first longitudinal vein ending in the costa and being connected with the second vein by a short cross-vein. But it became much more difficult to define this genus since the discovery of the North American *P. tipulina*, which does not possess this character. In this species the first vein is incurved towards the second and ends in it, just as it does in all the other *Cylindrotomina*. The affinity of the two species is otherwise evident, and in their sculpture, coloring, and general appearance, they are sufficiently distinguished from the other

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Cylindrotomina, to form a separate genus. (Compare the general remarks on the genera of this section, p. 295.)

The head is somewhat attenuated posteriorly; the palpi of *P. tipulina* have the last joint elongated, longer than the two, but shorter than the three preceding taken together. The first joint of the antennæ is cylindrical, elongated; the second cyathiform; the joints of the flagellum (in *P. tipulina*) are elongated, cylindrical, slightly incrassated near the basis; the verticils are upon this incrassation, and therefore before the middle of the joint. These antennæ have exactly the same structure as the antennæ of many *Tipulæ*. In *P. replicata*, the joints of the flagellum are not incrassated at the basis, and the exceedingly short verticillate hairs are inserted in the middle of the joint; thus the likeness to *Tipula* is not so striking. Besides the verticils, the antennæ of the male of *P. tipulina* have a dense, delicate pubescence. The collare is somewhat more developed and broader in *P. tipulina* than in *P. replicata*. The thorax has the stout, compact shape, common to the *Cylindrotomina;* the thoracic suture is well marked, grooved in the middle, more shallow on the sides; the intervals between the thoracic stripes are somewhat depressed, but shallow and not marked with a groove or with conspicuous punctures; two distinct impressions at the basis of the scutellum. Feet long and rather strong; spurs long, divaricate; empodia distinct; last joint of the tarsi in the male distinctly excised at the basis on the under side.

The forceps of the male is very much like that of *Cylindrotoma;* the claw-shaped horny appendages are turned, in the state of repose, towards the upper anterior margin of the abdominal segment; the aculeus consists of three horny styles, connate at the basis, sharp and pointed at the tip (I have seen only the aculeus of *P. tipulina*). The ovipositor of *P. replicata*, according to Dr. Schiner, is short, with broad foliaceous valves.

The venation is somewhat different in the two only known species. The difference in the course of the first longitudinal vein has been alluded to above; I have also shown before, when speaking of the general characters of the *Cylindrotomina* (p. 290), that it would be perhaps a more correct interpretation of the course of the first vein of *P. replicata*, if we considered this vein as ending in the second vein, and the latter emitting a branch towards the anterior margin. The venation of *P. replicata* viewed

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in this way, would be analogous to that of most *Tipulæ*. The præfurca (in *P. tipulina*) forms a perfectly straight line with the third vein; the remaining portion of the second vein looks therefore as if it was emitted from this continuous vein; it is almost angular at the basis, and emits from this angle a short stump of a vein, projecting inside of the marginal cell; owing to this peculiar course of the second vein, the submarginal cell is square at its inner end, which is in a straight line with the inner end of the first posterior cell.

In *P. replicata* the third vein is much less conspicuously in a straight line with the præfurca; the remaining portion of the second vein is gently arcuated, and not angular at its inner end; there is no stump of a vein upon it; the submarginal cell is distinctly longer than the first posterior, and hence, their inner ends are not in one line. In both species the second posterior cell is attenuated at the inner end, its line of contact with the discal cell being very short; in some specimens (according to Dr. Schiner's statement) this cell is actually petiolated; the discal cell is elongated; the fifth longitudinal vein is abruptly incurved towards the margin at its tip; the sixth is straight; the seventh nearly so; the posterior margin of the wing has the propensity to fold (hence the name of the European species *P. replicata*).

Heretofore, only the two above-named species of *Phalacrocera* have been described. The name of the genus is derived from φαλακρός, bald, in allusion probably to the almost glabrous antennæ of the European species.

The larva of *P. replicata* has been described by Degeer, Vol. VI, p. 351, Tab. XX. It lives in the water, among aquatic plants and mosses, is greenish-brown, bearing a number of long, soft and flexible filaments, looking like spines. It remained all winter in the larva state, although a crust of ice formed on the vessel which contained it. In May, the larvæ transformed into pupæ and floated in this state on the surface of the water. The posterior end of the pupa has several pairs of hooks, by means of which it can seize the stems of the plants and descend below the surface of the water.

Description of the species.

1. P. tipulina O. S. ♂.—Fuscescens, capite et thorace supra obscure cinereis, hoc obsolete vittato, pleuris canis; vena longitudinalis prima in secundam, non in costam, excurrit.

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Brownish; head and thorax dark cinereous above, the latter with obsolete stripes; the first longitudinal vein ends in the second, not in the costa. Long. corp. 0.55.

Syn. ***Phalacrocera tipulina*** **O. Sacken, Proc. Entom. Soc. Phil. 1865, p. 241.**

Head considerably narrowed posteriorly, blackish above, with a yellowish-cinereous bloom and a small reddish spot in the middle of the vertex, posteriorly; the under side of the head is brownish; proboscis brownish-yellow; palpi brown; the antennæ, if extended backwards, would reach the end of the second abdominal segment; they are dark brown or black; the first half of the first joint and the basis of the third are reddish; the first joint cylindrical, elongated; the second short; the third and the following joints are elongated, cylindrical, somewhat incrassated on their anterior half, and with the verticils inserted on that incrassation; the flagellum is clothed on both sides with a very short and soft pubescence (the structure of the antennæ is remarkably like that of some *Tipulæ*). Thorax above with a yellowish-cinereous bloom, concealing the blackish ground color; the latter is more apparent in the place of the usual stripes, whereas the cinereous bloom is more dense in the somewhat impressed intervals between the stripes; sternum black between the first and second pairs of coxæ and this black color extends upwards, in the shape of a stripe over the pleuræ; a black spot near the basis of the halteres; the remaining portion of the pleuræ brownish-yellow; the whole of the pleuræ is covered with a dense hoary bloom, so that their black portions are visible in a certain light only; collare rather broad, brownish; scutellum and metanotum brownish-yellow, the latter with a yellowish, shining reflection; halteres dusky; coxæ yellowish, with a hoary bloom; femora tawny, yellowish at the basis, and infuscated at the tip; tibiæ brownish, darker at the tip; tarsi brown. Wings with a brownish-cinereous tinge, stigma pale brownish, small, oblong (the venation has been described among the generic characters). The first longitudinal vein in this species, as in all the *Cylindrotomina*, is incurved towards the second, and has, at some distance before the tip, a rather indistinct, slender, oblique cross-vein connecting it with the costa.

Hab. White Mountains, N. H.; two male specimens.

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Section VIII. PTYCHOPTERINA.

Only a single longitudinal vein posterior to the fifth vein; two submarginal cells. Labium largely developed; palpi long. Tibiæ with spurs at the tip. Thoracic suture deeply sinuate.

The five known genera of this section form two distinct groups, distinguished by the following characters:—

1. No subcostal cross-vein; first submarginal cell much longer than the second; three or four posterior cells; collare obsolete; a peculiar, small spatulate, membranaceous, ciliated organ at the foot of the halteres: *Ptychoptera, Bittacomorpha.*

2. A subcostal cross-vein is present; the second submarginal cell is much longer than the first; the number of posterior cells is raised to six, in consequence of the presence of a supernumerary longitudinal vein in the first posterior cell; collare large: *Protoplasa, Tanyderus, Macrochile.*[1]

Ptychoptera alone occurs in Europe: it is common to that continent and to America; *Bittacomorpha* and *Protoplasa* have been found in North America only; *Tanyderus* in South America; *Macrochile* is included in the Prussian amber.

This section is the most aberrant of all the *Tipulidæ*. The venation shows peculiarities not found elsewhere; the large development of the labium, the prolonged epistoma, the deeply sinuate thoracic suture, etc., separate the *Ptychopterina* entirely from the rest of the family, and the latter character may be indicative of a relationship to the *Blepharoceridæ*.

Gen. XLIV. PTYCHOPTERA.

Two submarginal cells, the first much longer than the second; no subcostal cross-vein; no discal cell; four posterior cells, the second very short; only a single longitudinal vein after the fifth vein (Tab. II, fig. 19,

[1] I do not know about the collare of *Macrochile*.

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wing of *P. rufocincta*). Antennæ 16-jointed; last joint very small. Tibiæ with strong, divaricate spurs at the tip; empodia large. Thoracic suture deeply sinuate. Abdomen of the male club-shaped at the tip, with a coriaceous, often apparently double, forceps.

Head transverse, sessile; epistoma projecting, subtriangular, rounded at the tip; proboscis with very large suctorial flabs; palpi very long; last joint whiplash-shaped, once and a half the length of the three preceding joints taken together, or longer; among the three first joints the second is the longest.[1] Eyes large, separated by a broad space on the upper and on the under side of the head. The antennæ of the male are comparatively long; bent backwards, they reach somewhat beyond the basis of the abdomen; those of the female are shorter; they are sixteen-jointed; scapus short, the first joint being but little longer than the second; the first joint of the flagellum is cylindrical, twice the length of the second; the following joints are almost cylindrical, slightly decreasing in length towards the tip, clothed with a microscopic down, and with scattered, verticillate hairs; the last joint is very small in the European species; in the American *P. rufocincta* it is hardly perceptible even in fresh specimens. The collare is small, almost obsolete, concealed under the somewhat projecting mesonotum; the latter is gibbose; the thoracic suture forms a deep sinus in the middle, the bottom of which nearly reaches the scutellum; the sides of this sinus are prolonged anteriorly in the shape of furrows, as far as the anterior margin of the mesonotum; the metathorax is large, convex. The abdomen of the male is narrow and rather abruptly club-shaped at the tip; the forceps of *P. rufocincta*, which I have examined upon a fresh specimen, has the following structure: the last dorsal segment of the abdomen has a strong excision in the middle; under it is the forceps, which consists of an elongated, curved, coriaceous outside lobe, and an inner piece, apparently horny, fastened to the lobe; between the two halves of the forceps, the horny aculeus is visible. In the European species the tip of the abdomen shows four rather long, projecting appendages, having

[1] In describing the generic character, I had, besides *P. rufocincta*, specimens of the European *P. albimana* and *contaminata* before me. Some data, for instance those on the forceps and on the palpi, are taken from a fresh specimen of *P. rufocincta;* its palpi, when extended backwards, could almost reach the second abdominal segment.

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the appearance of a double forceps; but the upper pair seems to represent the last dorsal segment of the abdomen, only very much excised, and with the sides developed into elongated, forceps-like appendages. Interpreted in such a manner, the structure of the forceps in the American and in the European species is perfectly homologous. The abdomen of the female is also narrowed at the basis, broader in the middle; the upper valves of the ovipositor of *P. rufocincta* are broad, convex above. Feet rather strong, especially the hind tibiæ and tarsi; coxæ moderately developed; tibiæ with strong, divaricate spurs at the tip; the tarsal joints in the male are attenuated at the extreme basis, which is not the case in the females; the fourth tarsal joint of the male has the basis incrassated, and with a tuft of hair; the ungues are very small, the empodia rather large and not linear, as usual among the *Tip. brevipalpi*, but short and transverse. Wings of moderate breadth, in some species comparatively broad; the surface is clothed with a microscopic pubescence, visible under a lens of moderate power, and especially dense in the apical portion. The peculiarities of the venation are numerous; the principal ones are: the absence of the subcostal cross-vein; the length of the first submarginal cell, which is usually twice the length of the second; in other words, it is not the second longitudinal vein which is forked, as in most *Tipulidæ brevipalpi*, but the third; the central cross-veins are nearly in the middle of the wing; there is no discal cell; the anterior branch of the fourth vein alone is forked, and this fork is very short; the latter portion of the fifth vein is bisinuated; a striking fold, almost like a spurious vein, runs along the last longitudinal vein, crosses the anal cell, and ends at the tip of the fifth vein; beyond the fifth longitudinal vein, there is only a single vein, and not two, as in all the *Tipulidæ brevipalpi;* this vein apparently represents the seventh longitudinal vein, the sixth being obsolete; it is strongly arcuated at the tip (compare the wing of *P. rufocincta*, Tab. II, fig. 19). In the first posterior cell there is a longitudinal fold, which has not attracted any attention before, but deserves to be noticed, as it seems to foreshadow the supernumerary longitudinal vein, which, in *Protoplasa* and its congeners, divides the first posterior cell in two parts. This fold is especially distinct in the European *P. albimana*, where it assumes the appearance of a spurious vein, abruptly terminating somewhat beyond the inner end of the

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second submarginal cell; it is much weaker in *P. contaminata* and in the North American *P. rufocincta*.

The venation of the three species which I have seen (*P. albimana, contaminata, rufocincta*) is pretty much the same; only in *P. albimana* the præfurca is shorter and the first submarginal cell is not sessile, but has a short petiole. The American *P. rufocincta* has also a very short præfurca.

Mr. Westwood (*Introd.* II, p. 526) was the first to call attention to a singular organ in the shape of a membranaceous, spatulate, small appendage, ciliated on the margin (Westw., l. c., fig. 126, 7), and inserted at the foot of the halteres of *Ptychoptera*. I notice the same appendage in *Bittacomorpha*, but none in *Protoplasa*. Its use or homology is unknown; it has nothing in common with the tegulæ, which are usually inserted more in front of the halteres.

Five European species are known; a sixth, *P. pectinata* Macq. (*Hist. Nat. Dipt.* I, 77), from the North of France, is distinguished by the antennæ being pectinated, as in *Ctenophora*. It seems to be very rare; Mr. Rondani introduced for it the new genus *Ctenoceria*. The American species, *P. rufocincta*, is quite common. I have never found *P. 4-fasciata* Say (*Long's Exped.* etc. p. 359), also described by Wiedemann; nor *P. metallica* Walker (*List*, etc. I, p. 80), from Hudson's Bay. No *Ptychopteræ* from any other part of the world seem to have been published.

The insects of this genus are found in the vicinity of stagnant waters, where their larvæ live. The larvæ and pupæ have very early attracted the attention of naturalists, and have been often figured (Réaumur, *Mém.* Vol. V; Lyonnet, *Œuvres posthumes*, Tab. XVIII, fig. 1–7; Van der Wulp, *Handel. Nederl. Entom. Ver.* I, 1, p. 31; Lacordaire, *Introd. à l'Entom.* Tab. II, fig. 5; Tab. V, fig. 20, gives a copy of Lyonnet's figure). The larvæ have a long tube at the end of the body, which they raise to the surface of the water for breathing. In the pupæ, one of the horny processes, which distinguish the thorax of all the pupæ of *Tipulidæ*, is enormously prolonged, likewise for the purpose of breathing under water (compare p. 10).

The genus *Ptychoptera* (from πτυχή, fold, and πτερόν, wing) has been introduced by Meigen, in 1803 (*Illiger's Magazin*, II, p. 262).

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Description of the species.

1. P. rufocincta O. S. ♂ and ♀.—Nigra, antennæ, basi exceptâ, nigræ; epistoma fulvum; pedes fulvi; abdomen nigrum, fasciis ferrugineis; alis maculâ basali et fasciis tribus fuscis.

Black, antennæ, except the basis, black; epistoma fulvous, feet fulvous; abdomen black, with ferruginous bands; wings with a brown basal spot and three brown bands. Long. corp. 0.28—0.32.

Syn. *Ptychoptera rufocincta* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 252.

Head black, shining, proboscis and epistoma reddish-yellow; basal joints of the antennæ brownish; flagellum black. Thorax black, less shining than the head; pleuræ reddish-yellow; a silvery reflection is sometimes perceptible upon them; halteres pale, somewhat dingy; feet reddish-yellow; tips of the femora, of the tibiæ, and the larger part of the tarsi brown; the first joint of the posterior tarsi yellowish. Abdomen black, with ferruginous bands, which occupy the anterior portion of the segments; the last segments, including the forceps and the ovipositor, are reddish-yellow; the venter is yellowish. Wings with a brown spot at the basis, an abbreviated pale brown band across the middle of the two basal cells; another band along the central cross-veins, reaching the fifth longitudinal vein; a third band, consisting sometimes of two unconnected spots at the inner end of the two forks, in the apical portion of the wing; the interval between the costa and the first vein is more or less brownish. These bands, especially the last, are sometimes very weakly marked. Præfurca very short, arcuated; first submarginal cell sessile or nearly so.

Hab. United States, not rare. Pennsylvania; Washington, D. C.; Dobb's Ferry, N. Y.; Virginia (Dr. Wilson); Quebec (Couper); Illinois (LeBaron); White Mountains, N. H., etc.

Gen. XLV. BITTACOMORPHA.

Two submarginal cells, the first much longer than the second; no subcostal cross-vein; no discal cell; *three posterior cells*, the inner ends of which are nearly in one line; only a single longitudinal vein after the fifth vein (Tab. II, fig. 20). Antennæ 20-jointed. Tibiæ with small spurs at the tip; first joint of the tarsi very much incrassated; empodia distinct. Thoracic suture deeply sinuate. Abdomen slender, very elongated, with a forceps consisting of four coriaceous, digitiform, somewhat curved appendages (Tab. IV, fig. 31, 31 *a*).

Head rather large, transverse, applied to the thorax with a

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rather broad surface; epistoma narrow, very much prolonged, pointed at the end; proboscis with large suctorial flabs; palpi very long, all the joints being elongated. Eyes large, separated by a moderately broad interval on the upper side of the head, and a broader one on the under side. The antennæ of the male are twice the length of the head and the thorax, or more; first joint very small; the second but very slightly larger; the flagellum is filiform, and consists of (apparently 18) subcylindrical joints of nearly equal length; only the first is a little longer; it is clothed with a microscopic down, without any longer hairs. The thorax is very small in comparison to the size of the body; the collare is not visible, the head being in contact with the mesonotum; the thoracic suture is deeply sinuate in the middle; the metathorax is large and convex. The abdomen of the male is long and narrow, attenuated at the basis; the forceps (Tab. IV, fig. 31, from below, 31 *a* from above) consists of two pairs of digitiform, somewhat curved coriaceous appendages.

The ovipositor of the female, which I have not observed on living specimens, does not show the usual horny, pointed valves. I perceive only a pair of small, very little projecting valvules, apparently of a thin, coriaceous consistency, sickle-shaped, rounded at the tip. Feet long, femora remarkably slender, especially on their basal half; tibiæ somewhat stouter than the femora, with small spurs at the tip; the first joint of the tarsi is somewhat longer than the four following taken together, incrassated, spindle-shaped; the second joint is once and a half the length of the third; the fourth and fifth are very small, and their length, taken together, is hardly equal to the third joint; the empodia are broad, transverse. Wings shorter than the abdomen, small and narrow for the size of the insect; glabrous, hyaline; the stigma is hardly indicated by a narrow streak along the first longitudinal vein; the tip of the auxiliary vein is opposite the tip of the fifth vein; no subcostal cross-vein; marginal cross-vein at the tip of the first longitudinal; præfurca very short; first submarginal cell nearly three times the length of the second; three posterior cells, none of the branches of the fourth vein being forked; the inner ends of the first submarginal and of the three posterior cells are nearly in one line; the section of the fifth posterior vein beyond the great cross-vein is bisinuated (as in *Ptychoptera*); only one longitudinal vein

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beyond the fifth; the two basal cells do not reach much beyond the middle of the wing (Tab. II, fig. 20).

The peculiar membranaceous, spatulate, ciliated appendage, inserted at the foot of the halteres, and observable in *Ptychoptera*, exists also in *Bittacomorpha*.

The relationship of *Bittacomorpha* and *Ptychoptera* is very great and evident, all the difference of the outward appearance notwithstanding. A rather large, transverse head, closely applied to the thorax, a pointed epistoma, long palpi, large lips, a small antennal scapus, a sinuate thoracic suture, an almost obsolete collare, a large metathorax, the spatulate appendage, are characters common to both genera. The male forceps of both have a similar structure; the venation is almost the same; if we suppress the fork, inclosing the second posterior cell of *Ptychoptera*, we obtain the venation of *Bittacomorpha*.

The only known species of the genus, *B. clavipes*, was first described by Fabricius, as *Ptychoptera clavipes*, in 1781. Mr. Westwood erected the genus *Bittacomorpha* for it (*Lond. and Edinb. Philos. Mag.* 1835, p. 281). It has been found in North America only.

The name is derived from *Bittacus*, a neuropterous insect, and μορφή, shape, on account of a slight resemblance between the two genera.

Description of the species.

1. B. clavipes Fab. ♂ and ♀.—Nigra, mesonoti vittâ, metathorace, pleurisque albis; pedibus albofasciatis.

Black, a stripe on the mesonotum, the metathorax and the pleuræ white; feet banded with white. Long. corp. 0.55.

Syn. *Tipula clavipes* Fabricius, Spec. Insect. II, 404, 19; Mantissa Ins. II, 323, 21; Ent. Syst. IV, 239, 25.
Ptychoptera clavipes Fabricius, Syst. Antl. 22, 4.—Wiedemann, Auss. Zweifl. I, p. 59.
Bittacomorpha clavipes Westwood, Lond. and Edinb. Philos. Mag. 1835, p. 281.

Head silvery white in front, vertex black on both sides; proboscis, palpi, and antennæ brownish-black; thorax velvet black above, with a white longitudinal line in the middle of the mesonotum; pleuræ silvery white, sericeous; metathorax likewise; scutellum yellowish; halteres with a brownish knob; femora

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pale at the basis, their latter half blackish; tibiæ black, with a brown ring near the basis; first joint of the tarsi black, white at the basis; the second and the third white; the two last joints black; abdomen brownish-black, the posterior margins of the segments, beginning with the second, paler. Wings hyaline.

Hab. North America, not rare. Newfoundland, common (Westw.); Nova Scotia (Brit. Mus.); Washington, D. C., not rare; Upper Wisconsin River (Kennicott); Florida, where I caught it in March. This insect occurs early in the spring and also, but more seldom, in autumn; usually in the vicinity of water, especially in woody localities. A number of *Bittacomorphæ*, flying slowly, as they do, and keeping their feet, variegated with snow-white, extended like the radii of a circle, present a very striking appearance.

Gen. XLVI. PROTOPLASA.[1]

Two submarginal cells, the second much longer than the first; a subcostal cross-vein at the tip of the auxiliary vein; a discal cell; *six posterior cells, in consequence of the first being divided in two by a supernumerary longitudinal vein*; the penultimate posterior cell contains a supernumerary cross-vein; only a single longitudinal vein after the fifth vein; anal angle projecting, square. Antennæ 15-jointed. Tibiæ with spurs at the tip.

Head elongated; eyes separated by a moderately broad front above, almost contiguous on the under side of the head; epistoma longer than broad; the proboscis, together with its large, fleshy flabs, is not much shorter than the head; palpi longer than the head, joints elongated.[2] Antennæ (♀ ?) apparently 15-jointed,

[1] I possess two, somewhat injured specimens of *P. fitchii*. Only a single antenna seems to be entire, and I count 15 joints upon it. One of the specimens has no head; the neck of the other is so twisted that I did not perceive its length, until my attention was called upon it by the description of *Tanyderus* Philippi; this is the reason why the length of the neck is not mentioned in *Proc. Acad. Nat. Sci. Philad.* 1859.

[2] In *Macrochile* Loew (comp. below) the length of the palpi is dependent on the elongation of all the joints, not of the last chiefly, as in *Ptychoptera*. The second and the last joints are represented by Mr. Loew as being of equal length, and somewhat longer than the first and the third. In *Tanyderus* Philippi, likewise, all the joints are elongated, the last not being much longer than the preceding ones. As far as I can perceive, the palpi of *Protoplasa* have a similar structure, although I cannot describe them accurately from a dry specimen.

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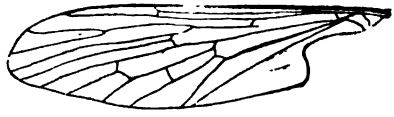
not longer than the head and proboscis taken together; first joint very short; second stout, subglobular; flagellum gradually attenuated; its first joint is attenuated at the basis, a little longer than broad; the following two or three joints are short, square; the next ones are somewhat more oval, elongated; the flagellum is clothed with moderately long hairs. Collare extended into a long neck; thoracic suture (as far as I can perceive on my specimens) deeply sinuate; scutellum large, very much projecting; metathorax usually small. Abdomen rather short, stout. Feet moderately long and stout; tibiæ armed at the tip with moderately long, strong, divaricate spurs; empodia indistinct; ungues smooth.[1] Wings (Fig. 7) broad, with a very projecting, square anal angle; the venation is very peculiar; auxiliary vein comparatively short, reaching but little beyond the middle of the wing; subcostal cross-vein at its tip; the first longitudinal vein reaches far beyond the auxiliary vein; there is no marginal cross-vein, and hardly any vestige of a stigma; the origin of the præfurca is unusually near the basis of the wing; it has a conspicuous stump of a vein on its curvature; the first submarginal cell is less than half so long as the second; the first posterior cell is a little shorter than the second submarginal; it is divided longitudinally in two halves by a supernumerary vein, which starts from the middle of the small cross-vein and runs parallel to the two adjoining longitudinal veins; discal cell very long, in the shape of a narrow triangle, truncate at the tip; its inner end, as well as the inner ends of the two last posterior cells are somewhat anterior to the inner end of the first posterior cell; the penultimate posterior cell is formed by the last branch of the fourth vein (or the posterior intercalary vein, comp. p. 34), which, in this case, issues close by the inner end of the discal cell; this penultimate posterior cell has a supernumerary cross-vein in its middle; the fifth vein is somewhat angular, the sixth nearly straight; the spurious cell is very large, triangular; in consequence of the great length of

Fig. 7.



[1] The two last statements are repeated from *Proc. Acad. Nat. Sci. Philad.* 1859; I cannot well verify them now, as there is only a single foot left.

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the cells in the apical portion of the wing, the basal cells are short; the first is longer than the second.

I am uncertain about the sex of my specimens, as the tip of the abdomen shows no trace either of a forceps or of an ovipositor; I am inclined to think that they are females, and that the ovipositor of this genus has very short, almost indistinct horny appendages, or none at all.

The next relatives of *Protoplasa* are, the amber genus *Macrochile* Loew, and the Chilian genus *Tanyderus* Philippi.

Tanyderus[1] Philippi (*Verh. Zool. Bot. Gesellsch. in Wien*, 1865, p. 780, Tab. XXIX, fig. 57) shows, in almost all respects, the greatest resemblance to *Protoplasa;* the same large suctorial flabs and long palpi; long neck; projecting scutellum; venation almost identical; anal angle likewise square, only more pointed; the wings pictured in a similar manner. The only differences which I can discover are: the antennæ are longer and consist of at least twenty-five joints, the last ones being difficult to count; the first vein and both branches of the second vein are very much arcuated, whereas they are nearly straight in *Protoplasa;* there is no supernumerary cross-vein in the penultimate posterior cell, but there is one in the first posterior cell (which does not exist in *Protoplasa*). "The abdomen of the male," says Dr. Philippi, "ends in two filaments." As this author had only one of the sexes before him, did he not mistake the female for a male? *Tanyderus* is represented by a single species, *T. pictus*, from Chile.

Macrochile[2] Loew (*Linnæa Entomologica*, Vol. V, p. 402, 1851, Tab. II, fig. 24) is also remarkably like *Protoplasa;* nearly the same venation, the same square anal angle,[3] long proboscis, large lips, and long palpi. The only striking difference in the venation is, that the supernumerary cross-vein in the penultimate posterior cell, which distinguishes *Protoplasa*, is wanting here, as in *Tanyderus*, and that the præfurca is rounded near its origin, and has no stump of a vein. The eyes of *Macrochile*

[1] From τανύω, to extend, and δέρη, neck.

[2] From μακρός, large, and χεῖλος, lip.

[3] This is not mentioned in Mr. Loew's description, nor represented on his figure, but I have ascertained it on the original specimens, which I have seen. The statement about the structure of the collare, which I make further below, I owe to a written communication of Mr. Loew.

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are contiguous above the antennæ, which are likewise longer than those of *Protoplasa*, and nineteen-jointed; their structure is nearly the same; the collare is short, and in this respect *Macrochile* differs from the two other genera. *Macrochile* is represented by a single species, *M. spectrum*, found in the Prussian amber.

Macrochile, *Protoplasa*, and *Tanyderus* thus form a group of closely allied genera, distinguished by the presence of a discal cell, of a supernumerary longitudinal vein in the first posterior cell, the great length of the second submarginal cell in comparison to the first, the shortness of the basal cells, and some other very striking characters. That they are more closely allied to the *Ptychopterina* than to any other known group of *Tipulidæ* is proved by the presence of only six longitudinal veins, by the large development of the suctorial flabs, the great length and structure of the palpi, and the sinuosity of the thoracic suture of *Protoplasa*. *Ptychoptera* and *Bittacomorpha* have no discal cell, the second submarginal cell is only half so long as the first, and the first posterior cell is not divided in two by a supernumerary longitudinal vein, although this vein is foreshadowed by a fold which appears in its place in *Ptychoptera*.

The genus *Protoplasa* (from πρῶτος, the first, and πλάσσω, to form, in allusion to its relationship to a species belonging to a previous geological period) has been introduced by me in the *Proc. Acad. Nat. Sci. Philad.* 1859, p. 252.

Description of the species.

1. P. fitchii O. S.—Fuscano-cinerascens; alæ maculis ocellaribus brunneis in fascias confluentibus ornatæ.

Brownish-gray; wings banded with brown, the bands consisting of confluent brown spots. Long. corp. 0.3—0.35.

Syn. *Protoplasa fitchii* O. Sacken, Proc. Ac. Nat. Sc. Phil. 1859, p. 252.

Head grayish, epistoma, proboscis, and palpi brownish; antennæ paler. Thorax brownish-gray, opaque, stripes hardly visible; halteres with brown knobs; feet yellowish; knees, the tips of the tibiæ, of the first tarsal joint, and of the tarsi brown. Abdomen brownish; posterior margins of the segments paler. Wings whitish, with a brown picture occupying nearly the whole surface; on all the cross-veins and at the origins and the

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tips of the principal veins the brown of this picture is paler, forming ring-like spots or ocelli; the principal ones of these ocelli are: one, at the origin of the præfurca, connected with a brown spot, occupying the greater part of the base of the wing; another at the inner end of the first posterior cell, a third on the great cross-vein, and a fourth on the supernumerary cross-vein in the penultimate posterior cell; these three ocelli form a part of a broad brown band, running from the anterior to the posterior margin; the two next ocelli (one at the inner end of the first submarginal vein, the other at the posterior end of the discal cell) form, with two small ocelli on the hind margin of the wing, a second band, running across the wing; this band emits a branch which runs towards the tip of the wing and fills the whole apical portion of the double first posterior cell; there are some small ocelli along the apical margin of the wing.

I possess two specimens of this insect, for which I am indebted to Dr. Fitch; I am not aware of the precise locality, where they were taken; but it was probably either in the State of New York, or in the Green Mountains of Vermont. As stated above, I am in doubt as to the sex of these specimens.

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APPENDIX I.

SPECIES DESCRIBED BY PREVIOUS AUTHORS AND NOT CONTAINED IN THE PRESENT MONOGRAPH.

Say, Journal of the Academy of Natural Sciences in Philadelphia, III, p. 22.

Limnobia humeralis.

Dusky, beneath pale; wings hyaline, immaculate.

Inhabits Pennsylvania.

Antennæ fuscous, first joint and rostrum dull yellowish; front and vertex dull cinereous; thorax dark livid; humerus, two obsolete lines, and lateral margin as far as the wings yellowish; pleura and pectus pale yellow; scutel and metathorax color of the thorax; nervures dark brown, corresponding in arrangement with Meigen's fig. 2, pl. 6; feet dark brown; tergum dull yellowish, with a black line; venter white.

Length, two-fifths of an inch (fem.).

Say, Long's Expedition, Appendix.

Page 359. **Ptychoptera 4-fasciata.**

Wings hyaline, with four brown bands.

Inhabits Pennsylvania.

Head and thorax blackish-brown; antennæ, palpi, mouth and hypostoma, except near the base of the antennæ, whitish; wings with four brown, subequidistant bands, of which the third reaches the inner margin and the others are abbreviated; pleura, pectus, and feet yellowish-white, the incisures of the latter dusky.

Length to the tip of the wings nearly half an inch.

This species is infested by a parasite of the genus *Ocypete*. It occurred in June.

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Page 360. **Trichocera scutellata.**

Dark fuscous, scutel whitish.

Inhabits Northwest Territory.

Palpi blackish; thorax slightly tinged with livid; anterior angles and neck segments dull yellowish-piceous; scutel dull whitish; wings immaculate, whitish at base; poisers white, with a fuscous capitulum; coxæ and thighs at base, dull yellowish.

♂ and ♀. Length of the body three-twentieths of an inch.

Taken, in September, at the falls of Kakabikka, beyond Lake Superior. The posterior margin only of the scutel is dull yellowish-white in the male. This species seems to be closely allied to *T. parva* Meig.

Wiedemann, Aussereuropaische Zweiflügelige Insecten, Vol. I, p. 28.

Limnobia gracilis.

Brunnea, glabra; thoracis lateribus, pleuris abdominisque segmentis mediis apice flavidis.

Saftbraun, glatt; Seiten des Rückenschildes, der Brust und Spitze der mittleren Hinterleibsabschnitte gelblich. 7 Linien lang; ♂.

Pennsylvania.

Fühlerwurzel gelblich, Geissel braun. Untergesicht lichtgelblich. Stirne und Hinterhaupt braun. Rückenschild saftbraun, glatt; Schultern und Seiten lichtgelblich, Brustseiten und Brust gleichfalls; Schildchen und Hinterrücken saftbraun. Hinterleib viel länger als die Flügel, saftbraun, an der Wurzel mit weisslichen Flecken; erster Abschnitt am längsten, an der Spitze, wie auch der zweite und dritte, gelblich; folgende an den Einschnitten sehr schmal und wenig merklich weisslich; After gelblich; Bauch saftbraun mit gelblichen Einschnitten. Flügel wenig gelblich, mit braunem Randmale; Adern wie Meigen's Tab. VI, fig. 2. Schwinger gelblich, mit braunem Knopfe. Beine saftbraun.

(*Translation.*)—Brown, glabrous; sides of the mesonotum, pleuræ, and the posterior margins of the intermediate abdominal segments yellowish. Male seven lines long.

Basis of the antennæ yellowish, flagellum brown; under side of the face pale yellowish. Front and vertex brown. Thorax brown above, smooth; humeri and margins of the mesonotum pale yellowish, pleuræ and

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sternum likewise; scutellum and metathorax brown. Abdomen much longer than the wings, brown, with whitish spots near its basis; the first joint is the longest; its posterior margin, as well as that of the second and third joints, yellowish; the following joints have narrow and but litttle perceptible whitish margins; tip of the abdomen yellowish; venter brown, with yellowish margins of the segments. Wings but slightly yellowish, with a brown stigma; veins like Meigen, Tab. VI, f. 2. Halteres yellowish, with a brown knob; feet brown.

A. Fitch, Winter Insects of Eastern New York.

Trichocera brumalis.

Brownish-black; wings and legs pallid at their bases; poisers blackish; their pedicels whitish.

Length of the male 0.18; of the female 0.25, the wings expanding twice these measurements.

Thorax with an obscure grayish reflection. Abdomen in the male cylindrical, slightly narrower towards the tip; in the female elongated oval and pointed at the tip; each segment with a strongly impressed transverse line in its middle, and the posterior margin elevated into a slight ridge. Ovipositor fulvous, sometimes tinged with blackish. Wings hyaline, faintly tinged with dusky; inner margins ciliated with quite short hairs; nervures blackish. Legs very long, slender and fragile, blackish; femurs brown, gradually paler towards their bases.

Common in forests in the winter season, coming out in warm days, flying in the sunshine and alighting upon the snow, its wings reposing horizontally upon its back, when at rest. Even when the temperature is below the freezing point and the cold so severe as to confine every other insect within its coverts, it may be met with abroad, upon the wing. It is a plain, unadorned species, closely allied in its characters to the European *T. hiemalis*, but in a number of impaled specimens before me I can detect no stripes or bands upon the thorax, whilst the very obvious character of the legs and wings, being pallid at their bases, I do not find mentioned as pertaining to that species.

Macquart, Diptères Exotiques, Vol. I, 1, p. 66.

Limnophila carbonaria Bosc.

Thorace nigro; alis fuscis, maculis fasciisque hyalinis.

Tête testacée; parties postérieure du front brune. Museau

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court. Trompe et palpes bruns. Antennes : les premiers articles d'un fauve brunâtre ; les autres brunâtres ; premier assez court ; troisième et suivants oblongs, ovales ; les derniers manquent. Thorax d'un noir luisant ; côtés d'un brun luisant. Abdomen manque. Pieds : hanches fauves, ainsi que les cuisses antérieures : le reste manque. Balanciers bruns. Ailes brunes : un point blanc à la base des cellules basilaires ; une tâche hyaline avant la base de la marginale ; une bande hyaline avant la base de la sous-marginale ; l'intérieur de la discoïdale et des postérieures hyalin ; deux marginales, deux sous-marginales ; deuxième postérieure assez petite, à long pétiole. (De la Caroline.)

(*Translation.*)—Thorax black ; wings brown, with hyaline spots and bands.

Head testaceous ; back part of the front brown. Rostrum short ; proboscis and palpi brown. Antennæ : first joints brownish-fulvous ; the others brownish ; the first rather short, the third and following oblong, oval ; the last joints are wanting. Thorax black, shining ; pleuræ brown, shining. The abdomen is wanting. Feet : coxæ fulvous, as well as the fore femora ; the remainder is wanting. Halteres brown. Wings brown ; a white dot at the inner end of the basal cells ; a hyaline spot before the inner end of the marginal cell ; a hyaline band before the inner end of the submarginal cell ; the inside of the discal and of the posterior cells is hyaline ; two marginal and two submarginal cells ; the second posterior cell is short, with a long petiole. (From Carolina.)

Walker, List of the Specimens of the Dipterous Insects in the Collection of the British Museum, Vol. I.

Page 80. **Ptychoptera metallica.**

Nigro-ænea, abdomine apice fulvo, pedibus fuscis, femoribus fulvis, alis cinereis.

Body black ; head and chest bronze ; abdomen bronze black, tawny at the tip ; legs brown, pubescent ; thighs tawny, with brown tips ; wings gray, tawny along the fore border ; veins brown ; poisers dull tawny. Length of the body 3 lines, of the wings 6 lines.

St. Martin's Falls, Albany River, Hudson's Bay.

Some of the characters of this species differ from those of the other *Ptychopteræ :* the fifth longitudinal vein extends beyond two-thirds of the length of the wing, and there joins the fore border, the fourth is adjacent to the fifth till near the tip, and after emitting a branch, which runs parallel to it, is forked beyond

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three-fourths of the length of the wing; the forks are very short and one joins the fore border, the other joins the branch before mentioned; the latter, soon after its origin is divided, and its lower branch is again divided; at the source of its first division a short cross-vein joins it to the third, which is forked near the tip of the wing; the second is simple, but is joined to the third by a cross-vein, which has an outward angle, whence a vein proceeds to the hind border, near the tip of the wing; the first is forked.

Page 82. **Chionea aspera**, n. sp.

Obscure fulva, hirsutissima, antennis nigris, pedibus fulvis.

"Body dark tawny, very hairy; eyes black; feelers black, beset with long hairs, tawny at the base, a little longer than the head; legs tawny, long, stout, and very hairy. Length of the body 2 lines.

"St. Martin's Falls, Albany River, Hudson's Bay."

Chionea scita, n. sp. Fem.

Pallide fulva, hirsuta, antennis nigris.

Body pale tawny, longer and more slender than that of the preceding species, and much less hairy; eyes black; feelers black, less hairy than those of *C. aspera*, longer than the head; legs tawny, paler, more slender, less hairy, and a little longer than those of *C. aspera*.

Page 84. **Trichocera bimacula**, n. sp.

Cano fulva, thorace cano trivittato, abdomine fusco fasciato, antennis tarsisque fuscis, pedibus fulvis, alis limpidis, fusco bimaculatis.

Head and chest overspread with a slight hoary bloom; head tawny, palpi and eyes black, feelers brown, slender, pubescent, more than half the length of the body; chest brown, three indistinct hoary stripes on the disk of the shield; breast tawny, abdomen with alternate tawny and brown rings; legs tawny, slender, pubescent; knees and feet brown; wings colorless, with two small pale brown spots on the disk; veins brown; poisers tawny. Length of the body 2 lines; of the wings 5 lines.

Nova Scotia. From Lieut. Redman's collection.

Trichocera gracilis, n. sp. Fem.

Nigra, gracilis, pedibus fuscis, alis subcinereis, immaculatis.

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Body black, slender, dull; scutcheon and breast piceous; feelers black, nearly half the length of the body; legs brown; wings slightly gray, not spotted; veins black; poisers tawny, with piceous knobs. Length of the body 2 lines; of the wings 5 lines.

New York Factory. Presented by Dr. Rae.

Walker, Diptera Saundersiana.

Page 434. Div. I. Meig. Dipt. I, p. 131, Tab. V, fig. 5.

Limnobia turpis, Fœm.

Nigro-fusca; antennæ setaceæ, moniliformes, thorace breviores; caput et thorax cinereo tomentosa; abdomen piceum, apice fulvum; pedes fulvi, femoribus tibiisque apice, tarsisque nigris; alæ subcinereæ, venulis transversis infuscatis.

Blackish-brown. Antennæ black, setaceous, moniliform, rather shorter than the thorax. Head and thorax with cinereous tomentum. Abdomen piceous, tawny at the tip. Oviduct cylindrical, rather long. Legs tawny; tarsi and tips of the femora and of the tibiæ black. Wings grayish; veins brown, testaceous towards the base; transverse veinlets clouded; stigma brown. Halteres testaceous. Length of the body 5 lines; of the wings 10 lines.

Canada.

Page 436. Div. *n.*

Mediastinal vein at a little before two-thirds of the length of the wing; subcostal ending at about three-fourths of the length, connected with the radial by a transverse veinlet at its tip; radial and cubital springing from a common petiole, which is less than half their length, and which forms a right angle near its base; radial forked near its base; cubital forming near its base a very obtuse angle, whence proceeds the first externo-medial; the latter is rectangular near its base and is forked towards its tip, and is connected with the third externo-medial by two transverse veinlets; the outer one of these forms a slight angle, whence proceeds the second externo-medial vein; third externo-medial connected with the subanal by a transverse veinlet, which joins the middle of the hind side of the discal areolet.

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Limnobia biterminata, Fœm.

Fulva; antennæ fuscæ, setaceæ, pilosæ, submoniliformes, basi fulvæ; abdomen fuscum, basi fulvum; pedes testacei, longi, graciles; alæ subcinereæ, venis fuscis, venulis transversis apud costam nebulosis; halteres testacei.

Tawny. Antennæ brown, setaceous, pilose, submoniliform, tawny at the base, not half the length of the thorax. Abdomen brown, tawny at the tip. Legs testaceous, long, slender. Wings very slightly grayish; veins brown, testaceous at the base; transverse veinlets towards the costa clouded with brown. Halteres testaceous. Length of the body 6 lines; of the wings 10 lines.

United States.

Page 437. Div. *n*.

Structure of the wing-veins much like that of Div. N. Meig. Dipt. I, p. 133, Tab. VI, fig. 5, but the petiole whence spring the radial and cubital veins forms a right angle and emits the stump of a vein near its base, and the veinlet between the third externo-medial vein and the subanal is nearer the middle of the hind side of the discal areolet, which is as long as the second externo-medial vein.

Limnobia ignobilis, Fœm.

Cinerea; caput antice fulvum; palpi and antennæ nigra basi fulva; antennæ setaceæ, non moniliformes, thorace multo breviores; thorax fusco trivittatus; latera pectusque cana; abdomen subtus fulvum, apice rufescens; pedes fulvi; alæ subcinereæ, venulis transversis fusco subnebulosis.

Cinereous. Head tawny in front. Palpi and antennæ black, tawny at the base. Antennæ setaceous, not moniliform, much shorter than the thorax. Thorax with three brown stripes; sides and pectus hoary. Abdomen tawny beneath, reddish at the tip; oviduct rather long. Legs tawny; tarsi blackish (?). Wings grayish; veins black, tawny at the base; transverse veinlets slightly clouded with brown. Halteres tawny. Length of the body 5½ lines; of the wings 12 lines.

North America.

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Zetterstedt, Diptera Scandinaviæ, Vol. X, p. 3777.

Erioptera fascipennis.

Grisea; antennis obscuris; alis cinereo-hyalinis, undique villosulis, fasciâ nubeculari abbreviatâ, brunneâ; halteribus albidis. ♂ ♀. Long. ♂ 2½, ♀ saltem 3 lin.

Zett. Ins. Lapp. 831, 9, etc.

Tota griseo-fusca, opaca, pubescens. Antennæ obscuræ. Oculi nigri. Palpi fusci, articulo 2do incrassato. Thoracis limbus humeralis pallidus. Scutellum testaceum. Abdomen distincte pallide pubescens, in ♂ lineâ utrinque laterali et unicâ mediâ dorsali obscurioribus, in ♀ stylis caudalibus ferrugineo-flavis. Alæ sordide albidæ, irisantes, undique pube brevissimâ tenuissimâ vestitæ, nervis brunneis. Nubecula distincta, saturate brunnea; ex hac descendit fere ad medium alæ fascia angusta indeterminata valde obsoleta fusca, nervos transversos transiens; hæc vero pictura in ♀ paullo perspicuior quam in ♂. Areola obovata nervos tres simplices emittit. Nervus longitudinalis 9nus longiusculus, leniter flexuosus, apice ad marginem interiorem alæ non longe ab octavo remotus. Nervulus connectens[1] adest. Halteres albidi. Pedes pubescentes, fusci, femoribus basi paullo dilutioribus.

[*Translation.*—Gray, antennæ dark, wings grayish-hyaline, pubescent on the whole surface, and with an abbreviated clouded brown band; halteres whitish; ♂, ♀.

Altogether grayish-brown, opaque, pubescent; antennæ dark; eyes black; palpi brown, second joint incrassated. Humeral border of the thorax pale; scutellum testaceous; abdomen with a distinct pubescence of pale hairs, in the male on each side with a darker lateral line and a similar one in the middle; in the female, the ovipositor is ferruginous-yellow. Wings of a sordid whitish, iridescent, clothed on the whole surface with a very short and delicate pubescence; the veins brown. Stigma distinct, saturate brown; a narrow, indefinite, very obsolete brown band runs from it along the central cross-veins; this picture is more distinct in the female than in the male. Discal cell obovate; it emits three simple veins; the last longitudinal vein is elongated, gently sinuated; its tip is rather approximated to the tip of the preceding longitudinal vein. The connecting nervule is present.[1] Halteres pale. Feet pubescent, brown; femora paler at the basis.]

[1] Marginal cross-vein.

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Westwood, London and Edinb. Philos. Magazine, 1835.

Gynoplistia annulata, ♀.

Nigra, thorace coxisque læte fulvis; alis fuscis; abdomine sericie subaureâ obtecto; tibiis annulo centrali albo, tarsisque basi fulvescentibus; antennis ♀ 17-articulatis, articulis 3–9 ramum brevem obtusum emittentibus, 10mo interne acute producto, reliquis simplicibus. Long. corp. 5 lin.; exp. alar. 9½ lin. *Hab.* Amer. Sept. Mus. D. Hope.

[*Translation.*—Black, thorax and coxæ of a bright fulvous; wings brown; abdomen with a somewhat golden, sericeous reflection; tibiæ with a white band in the middle; tarsi yellowish at the basis; antennæ of the female 17-jointed; the joints 3–9 emit a short, obtuse branch; the tenth has a sharp projection on the inside; the following joints simple. Length of the body 5 lines; expanse of the wings 9½ lines. *Hab.* North America; collection of Mr. Hope.]

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APPENDIX II.

ON THE GENERA OF TIPULIDÆ BREVIPALPI NOT INDIGENOUS IN EUROPE OR IN THE UNITED STATES.

PERIPHEROPTERA[1] Schiner.

(Section **LIMNOBINA**; compare above, p. 53.)

The following is translated from Dr. Schiner's article in the *Verhandl. Zool. Bot. Gesellsch. in Wien*, 1866, p. 933:—

"Head attached rather low, short-necked, seen from above almost triangular; occiput strongly developed; eyes round, large, separated by the broad front; ocelli wanting; palpi four-jointed, the last joint shorter than the preceding; antennæ short, 14-jointed; first joint cylindrical, the second short and stout, the joints of the flagellum rounded, rather closely applied to each other, gradually diminishing in size; the last joint bud-shaped; all joints with delicate bristles near the basis. Thorax very convex; transverse suture deep; scutellum narrow, metathorax well developed; halteres large, with a big knob. Abdomen comparatively short, seven-jointed; genitals of the male in the shape of a forceps; the strong appendages are excised on the inside, pointed at the tip; ovipositor of the female horny, almost as long as the three last joints taken together. Feet very long and slender, tibiæ without spurs, the ungues dentate on the under side, empodia rudimentary. Wings clavate in their outline, the alulæ almost wanting; auxiliary vein long, connected about the middle of the wing by a cross-vein with the first longitudinal vein; the latter vein is incurved at the tip in the second vein, and connected by a cross-vein with the costa; the origin of the second vein is much beyond the middle of the wing; this vein is not forked; third longitudinal vein simple, strongly arcuated at the basis; the fourth vein is emitted by the fifth unusually far from the root of the wing; the discal cell emits three simple veins; the fourth vein is in a line with its posterior branch; fifth, sixth, and seventh veins nearly straight.

Type of the genus: *P. nitens*, n. sp.; Columbia, South America."

[1] From περιφερὴς, rounded, and πτερὸν, wing.

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Dr. Schiner's work, *Reise, etc. der Novara, Diptera*, does not contain any further details, except the description of the species *P. nitens* and a figure. *Peripheroptera* is evidently related to *Dicranomyia;* like some species of the latter genus, it has a very short præfurca, and the tip of the first longitudinal vein is incurved towards the second.

GYNOPLISTIA[1] Westw.

(Section **LIMNOPHILINA**; compare p. 192.)

Gynoplistia Westw., *Lond. and Edinb. Phil. Mag.* VI, p. 280 (syn. *Anoplistes* Westw., *Zool. Journ.* No. 20), is characterized thus:—

"Related to *Ctenophora*. Antennæ unipectinate in both sexes, ♂ 18-, ♀ 17-jointed; venation like that of *Ctenoph. flaveolata*."

Three species from New Holland and a fourth from North America are described. The author divides the genus in two sections: one, with the male antennæ having the joints 3–17 unipectinate; the other, the joints 3–17.

Macquart (*Dipt. Exot.* I, 1, p. 43) adds some new characters to the generic description, and in a subsequent volume (l. c. *Suppl.* I, p. 10) observes that *Gynoplistia* belongs to the *Tipulidæ* with short palpi, and not to those with long palpi, as might be inferred from Mr. Westwood's statement on its relationship to *Ctenophora*.

Those *Gynoplistiæ* which I have seen in the European collections undoubtedly belong to the section *Limnophilina;* their venation is like that of a *Limnophila* with five posterior cells; the structure of the male genitals of an Australian species which I have seen shows the opercule mentioned by Macquart (l. c. p. 43). I had no opportunity for studying these species in detail; nor do I know whether a *Gynoplistia*, from South America, which I have seen in the Berlin Museum, really belongs to the same genus with the Australian species; the degree of relationship of *Gynoplistia* to *Ctedonia* Phil. is likewise unknown to me.

[1] From γυνή, female, and ἐπλίζω, I arm.

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CEROZODIA[1] Westw.

(Section **LIMNOPHILINA**? compare p. 192.)

Cerozodia Westw., *Lond. and Edinb. Phil. Magaz.* VI, p. 281 (syn. *Ozocera* Westw., *Zool. Journ.* No. 20; nec *Ozodicera* Macq.), from Australia, is described thus:—

Limnobiæ affinis; antennæ thorace paulo longiores, articulis 32; 3–31 ramulum longum emittenti; palpi perbreves; alarum nervi ut in *Gynoplistia vili* dispositi.

This last mention seems to indicate that this genus belongs to the *Limnophilina*. I do not know anything about this genus, nor do I find it mentioned in subsequent publications, except Macquart's naked quotation (*Dipt. Exot.* I, 1, p. 65).

CLONIOPHORA[2] Schiner.

(Section **LIMNOPHILINA**; compare p. 192.)

The following has been translated from Dr. Schiner's article in the *Verh. Zool. Bot. Gesellsch. in Wien*, 1866, p. 932:—

Head rounded; eyes somewhat projecting, rostrum moderately prolonged, truncate in front, and beset with bristly hairs. Palpi four-jointed, the second joint short spade-shaped, third and fourth slender, nearly of the same length. Antennæ 18-jointed, first joint cylindrical, the second short cyathiform, 3–13 on the inside with a single lateral projection, which is very short on the joints 3 and 13; the last joints narrow and elongated, finely bristly. Thorax stout; abdomen more than three times the length of the thorax, somewhat flattened, the horny ovipositor very much projecting, almost as long as half the abdomen, stout at the basis, gradually attenuated, ending, beyond the middle, in two slender, somewhat arcuated valves; the lower valves do not reach beyond the middle of the upper ones. Feet rather strong, tibiæ with spurs, empodia strongly developed. Wings long and comparatively more narrow than in the genus *Gynoplistia*; the auxiliary vein is long, connected with the first longitudinal by a cross-vein near its tip; the venation is otherwise like that of *Gynoplistia*, only the terminal portions of the veins are all longer and more straight; halteres long with a large knob.

Type of the genus: *C. subfasciata* Walker; Australia.

[1] From κέρας, horn, and ὀζώδης, branched.

[2] Apparently from κλόνιον, the hip, and φέρω, I bear.

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PARATROPESA[1] Schiner.

(Section **LIMNOBINA ANOMALA**; see p. 132.)

The following is translated from Dr. Schiner's article in the *Verh. Zool. Bot. Gesellsch. in Wien*, 1866, p. 932:—

"Head, seen from above, almost triangular, the occiput strongly developed; the round, somewhat projecting eyes situated quite anteriorly; front broad and flat; ocelli wanting; rostrum very short; palpi four-jointed, the two last joints nearly of the same length; antennæ 15-jointed; first joint elongated, cylindrical, the second short, truncate in front, the joints of the flagellum oblong, diminishing in size towards the tip, finely pubescent; the last joint attenuated at the basis, not shorter than the preceding joint. Thorax very convex, rather abrupt in front, the collare being almost at a right angle to the mesothorax; it is strongly narrowed in front. Abdomen seven-jointed, about twice the length of the thorax, narrow and slender; forceps of the male rather strong; appendages folded backwards; a short, blunt intermediate piece near the basis. Feet slender; hind femora longer than the abdomen; the first joints of the tarsi long and rather strikingly incrassated, spindle-shaped, with a dense, short pubescence; ungues distinct; the empodium strongly developed, the pulvilli rudimentary. Wings broad, the anal angle much developed; auxiliary vein close by the first longitudinal; the latter gradually approaching the costa and merging into it without being incurved towards it; the second longitudinal vein originates about the middle of the wing, strongly arcuated in its whole course, almost at a right angle at its origin; forked not far from its tip; the anterior branch of the fork is short, the posterior one is in a line with the remainder of the vein; the marginal cross-vein is long and perpendicular, connecting the first and second veins in the region of the stigma; the inner end of the submarginal cell is in a line with the marginal cross-vein, and in immediate contact with the discal cell; the small cross-vein is therefore wanting; the discal cell emits three simple veins, running toward the margin; fifth vein quite straight; the sixth and seventh have nothing peculiar.

Type of the genus: *P. singularis*, n. sp.; Columbia, South America."

Although Dr. Schiner is in doubt about the relationship of this genus, I have shown above (p. 132) that, according to my opinion, it is related to *Teucholabis*.

[1] Probably from παράτροπος, deflected, averted.

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CTEDONIA[1] Philippi.

(Section **LIMNOPHILINA.**)

The following has been translated from Dr. Philippi's article in the *Verh. Zool. Bot. Ges. in Wien*, 1865, p. 602 (Tab. XXIII, fig. 2):—

Head small, globose, attenuated behind, produced anteriorly in a stout, horizontal rostrum. Eyes globose, rather remote. No ocelli. The antennæ in length are equal to about three-quarters of the head and the thorax taken together; from 15- to 24-jointed; first joint cylindrical, stout, the second equal to one-third of the first, subglobular; the following eight (or twelve) cylindrical, subequal, emiting a filament and thus forming a comb; the projection of the third joint is on the external side, and short; the fourth joint has one on the inside and another on the outside; the joints 5, 6, 7, 8, 9, 10 and beyond, have on the inside a long projection; joint 11 has a short one on the inside; the nine following joints are cylindrical, and difficult to distinguish. Palpi four-jointed, joints cylindrical, the fourth stout, rather short, although a little longer than the third. The tibiæ have two spurs at the tip.

Four species from Chile are described. The wings, as I judge by the plate, have two submarginal, five posterior, and a discal cell; the second submarginal and first posterior have their inner ends almost in a line; the second marginal is but little shorter than the submarginal. The venation is altogether like that of an ordinary *Limnophila*.

POLYMORIA[2] Philippi.

(Section **LIMNOPHILINA** ?)

The following is translated from Dr. Philippi's article on the Diptera of Chile in the *Verh. Zool. Bot. Ges. in Wien*, 1865, p. 608 (Tab. XXIII, fig. 3):—

"Head produced in a rostrum, as in *Tipula;* third joint of the palpi stout, the fourth slender. Antennæ short, 16-jointed; first joint elongated, cylindrical, stout; the second stout, subglobular; the following gradually decrease in size, short, *with long hairs.* Wings with six[3] posterior cells,

---

[1] From κτεδών, comb.

[2] From πολύς, much, and μόριον, part.

[3] Philippi says: six posterior cells; but both figures given by him show only five.

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the third petiolate; the veins, especially the apical ones, pubescent. Otherwise like *Tipula*."

Five species, all from Chile, are described. The generic character does not mention whether there are any spurs at the tip of the tibiæ or not; but in the description of one of the species, *P. lutea*, I find the statement "that the tibiæ have no spurs." If this is correct, the genus would have to be placed among the *Eriopterina*. The comparison to *Tipula* renders the question of the location of this genus somewhat doubtful. The venation is not unlike that of *Dactylolabis* (Tab. II, fig. 7).

LACHNOCERA[1] Philippi.

(Section **LIMNOPHILINA**? or **ERIOPTERINA**?)

The following is translated from Dr. Philippi's article in the *Verh. Zool. Bot. Gesellsch. in Wien*, 1865, p. 615, Tab. XXIII, fig. 5:—

"Antennæ, at least those of the male, are as long as the body, 13-jointed (?); first joint cylindrical, stout, elongated; the second of the same length with the first, gradually attenuated; the following ones slender, stouter in the middle, on both sides with long, hirsute hairs; the last joints are rather indistinct. Proboscis short; fourth joint of the palpi equal to the third in length (?). Wings with two marginal cells; the first large; the second short, separated from the first by an oblique vein; a single submarginal cell; four posterior cells; discal cell pentagonal; basal cells elongated, the second longer. Feet slender."

The genus is represented by a single species, *L. delicatula* Phil., from Valdivia, 2½ lines long. The figure represents a venation not unlike that of *Goniomyia*. *Lachnocera* may therefore be related to this genus, or to the *Limnophilæ* with four posterior cells.

POLYMERA[2] Wied.

(Section unknown; perhaps **AMALOPINA**?)

The following is extracted from Wiedemann's *Aussereurop. Zweiflueg elige Insecten*, Vol. I, p. 57:—

Antennæ 28 articulatæ: articulus primus globosus; secundus cylindri-

[1] From λάχνη, woolly hair, and κέρας, horn.

[2] From πολύς, much, and μέρος, part, in allusion to the numerous joints of the antennæ.

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cus, elongatus; basis articulorum sequentium multo breviorum, pilis verticillatis.

Pedes longissimi.

Habitus *Limnobiæ*. Nomen a πολὺς, multum, et μέρος, part.

[*Translation.*—Antennæ 28-jointed; first joint globose, the second cylindrical, elongated; the following joints much shorter, with verticillate hairs at their basis. Feet very long. Appearance of a *Limnobia*; the name, etc.]

Two species from South America are described; they are 3 and 3½ lines long; one is black, with brown wings, banded with white, the other brown, with hyaline wings. Wiedemann's figure (l. c. Tab. VI, b, fig. 4) represents a venation not unlike that of *Rhaphidolabis*, only all the cells in the apical portion of the wing are exceedingly long, the small and the great cross-veins, as well as the inner end of the discal cell, being before the middle of the length of the wing.

Macquart (*Dipt. Exot.* I, p. 64) gives a description and a figure of *Polymera fusca* Wied. To the generic characters he adds that the rostrum is very short; the palpi of equal length, the last joint slender, pointed; collare indistinct; feet slender; tibiæ with spurs at the tip; tarsi longer than the tibiæ. Wings with pubescent veins. Abdomen of the male flattened, with an elongated forceps.

Macquart's figure (l. c. Tab. VIII, fig. 1) shows a distinct thoracic suture and a venation similar to that figured by Wiedemann. As this insect has five posterior cells and spurs at the tip of the tibiæ, if it fits in any of our sections at all, it must belong either to the *Limnophilina* or to the *Amalopina*. The venation, especially the absence of a discal cell, reminds us of the *Amalopina*. But the male forceps, consisting, if Macquart represents it correctly, of two elongated slender halves, leaving an empty space between them, is very different from the forceps of the *Amalopina*. The presence of spurs on the tibiæ of *Polymera* excludes the probability of its relationship to the *Eriopterina*.

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EXPLANATION OF THE PLATES.

Remark. The wings figured on Plates I and II are all magnified about 4½ times, except the wings fig. 2 and 11 of Plate II, which are magnified 9½ times.

PLATE I.

1. **Dicranomyia** LONGIPENNIS *Schum.*
2. **Dicranomyia** PUBIPENNIS *O. S.*
3. **Dicranomyia** HÆRETICA *O. S.*
4. **Trochobola** ARGUS *Say.*
5. **Elephantomyia** WESTWOODI *O. S.*
6. **Toxorrhina** MAGNA *O. S.*
7. **Cylindrotoma** NODICORNIS *O. S.*
8. **Dicranoptycha** SOBRINA *O. S.*
9. **Orimarga** ALPINA *Zetterst.*
10. **Elliptera** OMISSA *Schiner.*
11. **Antocha** OPALIZANS *O. S.*
12. **Teucholabis** COMPLEXA *O. S.*
13. **Atarba** PICTICORNIS *O. S.*
14. **Rhypholophus** NUBILUS *O. S.*
15. **Rhypholophus** RUBELLUS *O. S.*
16. **Erioptera** CHLOROPHYLLA *O. S.*
17. **Erioptera** VENUSTA *O. S.*
18. **Erioptera** ARMATA *O. S.*
19. **Erioptera** sp. nov. (The wing was taken from a Californian specimen, closely allied to *E. hirtipennis* O. S.)
20. **Symplecta** PUNCTIPENNIS *M.*

PLATE II.

1. **Trimicra** PILIPES *Fab.*
2. **Goniomyia** SULPHURELLA *O. S.*

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3. Limnophila (Prionolabis) RUFIBASIS *O. S.*

4. Goniomyia SUBCINEREA *O. S.*

5. Gnophomyia TRISTISSIMA *O. S.*

6. Limnophila AREOLATA *O. S.*

7. Limnophila (Dactylolabis) MONTANA *O. S.* (The spots on this wing are omitted in the figure.)

8. Epiphragma SOLATRIX *O. S.*

9. Limnophila QUADRATA *O. S.*

10. Limnophila LUTEIPENNIS *O. S.*

11. Cryptolabis PARADOXA *O. S.*

12. Anisomera MEGACERA *O. S.* ♀.

13. Trichocera BIMACULA *Walk.*(?). The spots of this wing are omitted in the figure.

14. Amalopis CALCAR *O. S.*

15. Amalopis INCONSTANS *O. S.* The wing represented on this figure has two supernumerary cross-veins in the second submarginal cell, which do not exist in normal specimens.

16. Dicranota BIVULARIS *O. S.* ♀.

17. Rhaphidolabis TENUIPES *O. S.*

18. Plectromyia MODESTA *O. S.*

19. Ptychoptera RUFOCINCTA *O. S.*

20. Bittacomorpha CLAVIPES *Fab.*

PLATE III.

1. Dicranomyia DEFUNCTA *O. S.*; forceps from below.

Fig. 1*a*. the same from above; *aa*. soft, fleshy lobes; *bb*. horny, falciform appendages, movable with the lobes, and closely applied to them, although fastened by the basis only; *cc*. horny, projecting points of the internal apparatus.

2. Dicranomyia BADIA *Walk.*; forceps from above; *aa* and *bb* are the same as in fig. 1; *dd*. horny, square appendages, each bearing a pair of bristles; *e*. point of the anal style, visible between the two lobes.

3. Dicranomyia LIBERTA *O. S.*; forceps from above; *aa*. and *bb*. as in fig. 1; *dd*. horny, rostriform appendage, with a bristle.—Fig. 3*a*. point of the anal style, seen from below.

4. Dicranomyia GLADIATOR *O. S.*; one-half of the forceps from above; *a*, *b*. as in fig. 1; *e*. anal style.

5. Rhiphidia DOMESTICA *O. S.*; forceps from above and open; the lettering is the same as in the preceding figures.—Fig. 5*a* represents the same forceps from below and closed.

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[6. **Limnobia** SOLITARIA *O. S.*; forceps from above, half closed; *aa* are coriaceous, movable; *bb*. hooked appendages, consisting of two, closely applied lamels; the outer one horny; the inner one apparently coriaceous; *e*. the anal style; *cc*. projecting internal organs; *bb*. soft eminences (perhaps rudiments of the large soft lobes of *Dicranomyia*).

7. **Limnobia** INDIGENA *O. S.*; forceps from above; the lamels *bb* are double.

8. **Elephantomyia** WESTWOODI *O. S.*; one-half of the forceps; *aa*. horny appendages.

9. **Teucholabis** COMPLEXA *O. S.*; forceps from above; 9*a*. one-half of the same, from below; *aa*, *bb*. horny appendages.

10. **Antocha** SAXICOLA *O. S.*; forceps from above; *aa*. double appendages, consisting of a horny and of a soft part, closely joined.

11. **Dicranoptycha** NIGRIPES *O. S.*; forceps from above; *y*. short, black bristles; *xx*. indistinct horny appendages. When this species opened its forceps, a delicate, horny apparatus (figured separately, fig. 11*a*) was spread outside of it; *bb* is a slender forceps, moving independently of *aa*, and closing at the point *c*.

12. **Dicranoptycha** SOBRINA *O. S.*; one-half of the forceps.

13. **Cryptolabis** PARADOXA *O. S.*; forceps from above.

13*a*. the same from below; *aa*. horny appendages, small and indistinct, being closely applied to the fleshy part of the forceps; *b* seems to be the rudiment of an anal style.

13*b*. the tip of the abdomen of the female, from the side.

13*c*. the same from above; both show that there are no visible horny lamels; the prominences *aa* are beset with microscopic bristles.

PLATE IV.

14. **Erioptera** ARMATA *O. S.*; forceps from above.

14*a*. the same, from the side; its structure is somewhat complicated; besides the coriaceous parts, *dd*, there are two pairs of horny appendages; one of them is seen at *h*, in fig. 14*a*; when detached, it looks like fig. 14*b*, in which the portion *bbb* is closely applied to the coriaceous part *d* and *c* branches off. The other pair of appendages, *ee*, of fig. 14*a*, is slender and curved.

15. **Erioptera** CALOPTERA *Say*; forceps from below.

16. **Erioptera** VENUSTA *O. S.*; forceps from above.

16*a*. the same, from below; the horny appendages, *aa*, seen from below, appear double, consisting of the horny part, *bb*, and the membranaceous appendage, *cc*; fig. 16*b* represents it detached; its margin *d* is horny, the rest is membranaceous; these two appendages have an interval between them, although they move simultaneously.

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17. Goniomyia BLANDA *O. S.*; forceps from above and open.

18. Goniomyia COGNATELLA *O. S.*; half the forceps, from above.

19. Gnophomyia TRISTISSIMA *O. S.*; forceps from above, half open.
19*a*. ovipositor of the same species.

20. Erioptera VESPERTINA *O. S*; half the forceps.

21. Symplecta PUNCTIPENNIS *M.*; forceps from above; *a* and *b* are horny.

22. Cladura FLAVOFERRUGINEA *O. S.*; forceps from the side; *a* is convex, and seems to be horny inside; *c* is the forceps.

23. Limnophila APRILINA *O. S.*; forceps from above; the outer horny appendages have a longitudinal notch, represented on fig. 23*a*.

24. Limnophila ULTIMA *O. S.*; forceps from below.

25. Limnophila LUTEIPENNIS *O. S.*; forceps from above; *aa*. movable appendages; the outer ones horny.

26. Limnophila (Dactylolabis) MONTANA *O. S.*; forceps from above, closed (it is distinguished at once by the position of the appendages).
26*a*. the same, from the side; *a*. inner horny points, protruding when the forceps is opened.

27. Limnophila (Prionolabis) RUFIBASIS *O. S.*: forceps from above, open; *aa*. large, strong appendages, serrated on the inside; *bb*. also horny, figured separately, 27*a*.
27*b* is a slender, horny organ, which protrudes, when the forceps is opened; otherwise it is concealed.

28. Eriocera FULIGINOSA *O. S.*; forceps from above; *aa* are horny; *bb* soft; *c* is curved downwards, like fig. 27*b*.

29. Eriocera (Arrhenica) SPINOSA *O. S.*; forceps from above; *a*. horny, *b*. soft appendages; *cc*. internal clutching apparatus; the latter is figured separately, fig. 29*a*; at *d* is a joint, by means of which it is moved.

30. Amalopis INCONSTANS *O. S.*; forceps from above, and half open; it is difficult to convey a correct idea of it in a drawing; the horny points, *f*, *g*, *h*, are all curved upwards; the point *f* is bifid (fig. 30*a*), *bb* are soft; *cc* hollow inside; *h* is figured separately at 30*b*.

31. Bittacomorpha CLAVIPES *F.*; forceps from below.
31*a*. the same, from above.

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ADDITIONS AND CORRECTIONS.

Page 18, line 4 from the top: "1. In the *T. longipalpi*, the auxiliary vein ends in the first longitudinal, etc." In the genus *Pachyrrhina* the auxiliary vein, immediately before its termination in the first longitudinal, often has a stump of a vein, which, in some species, almost looks like a cross-vein, connecting it with the costa.

Page 19, line 14 from the top: "The *Tip. longipalpi* usually keep the wings divaricate in repose," etc. *Pachyrrhina* and even some *Tipulæ*, keep the wings folded in repose. The rule is less general than has been stated by former authors.

Pages 88, 89, 90: In the three Latin diagnoses on these pages, read "venula transversa" instead of "transversalis."

While this volume was in press, two new species, *Goniomyia manca* and *Erioptera forcipula*, have been added to it. The numerical data on pages 35 and the following were printed before this addition was made, and have to be modified accordingly. The abnormal character of one of these species, *Goniomyia manca*, requires that it should be quoted along with the genus *Cladolipes* (on page 24 and in the third foot-note on page 44), as an instance of an exceptional disappearance of one of the branches of the second longitudinal vein. For the same reason, on page 25, line 5 from the top, instead of "in *Goniomyia*," read "in *Goniomyia manca*."

On the same page, 25, the genus *Paratropesa* Schiner (compare page 132) may be quoted as forming an apparent transition between the *Tipulidæ* with one and those with two submarginal cells. It has a cross-vein in the marginal cell, which might be taken for a branch of the second vein, if every other character did not point to a relationship with *Teucholabis*. Hence I look upon it as having only a single submarginal cell, while Dr. Schiner placed it among those with two such cells. Dr. Schiner's work was received by me while this volume was in press.

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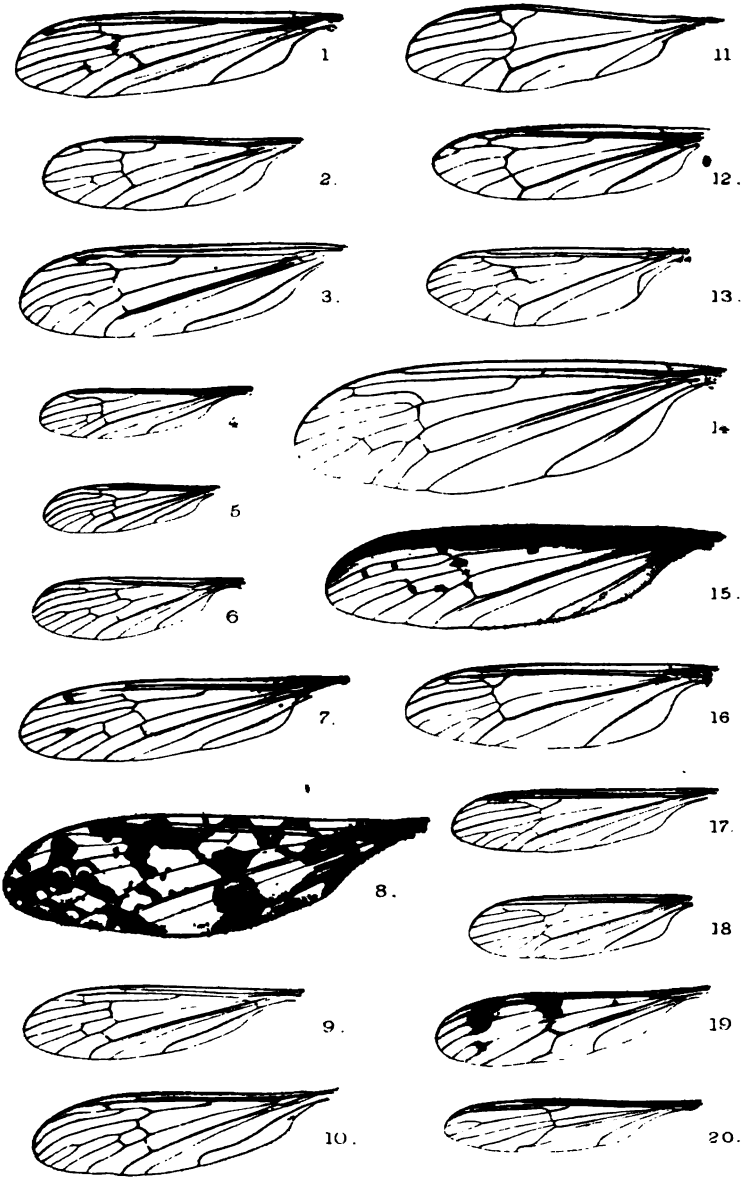

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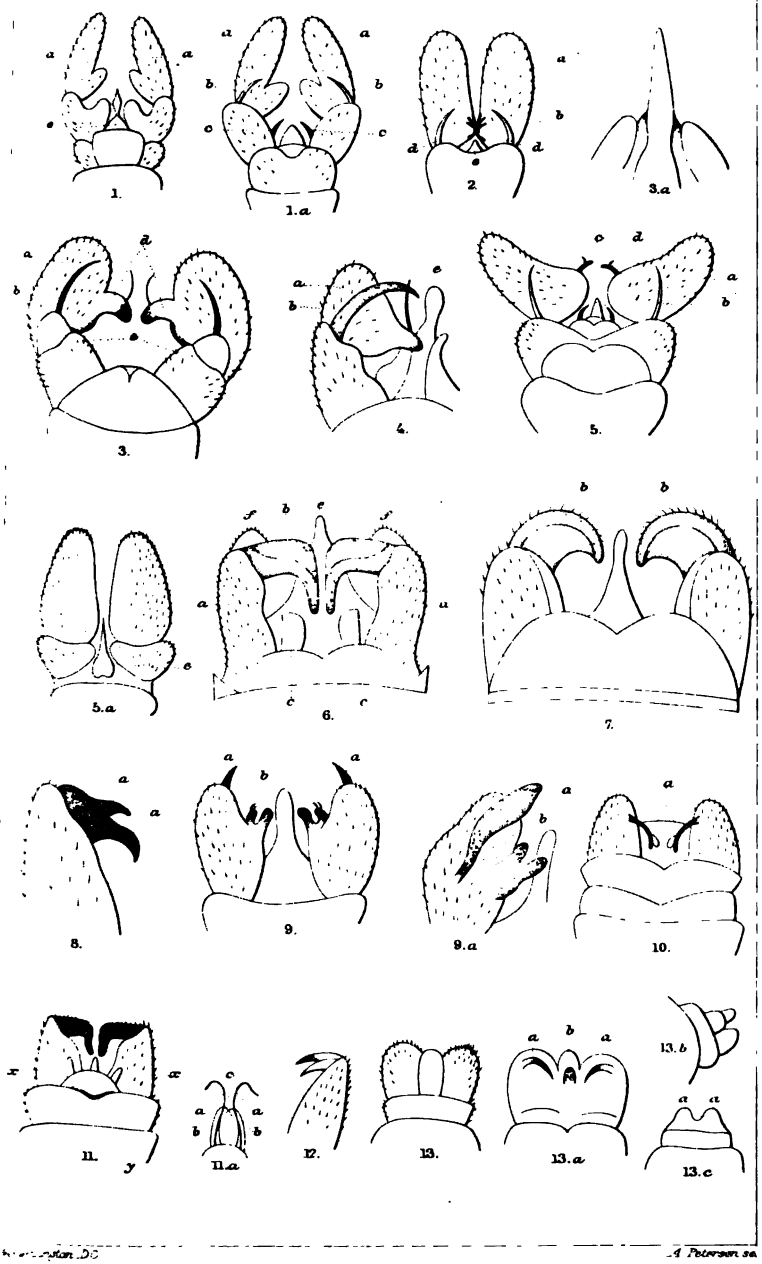
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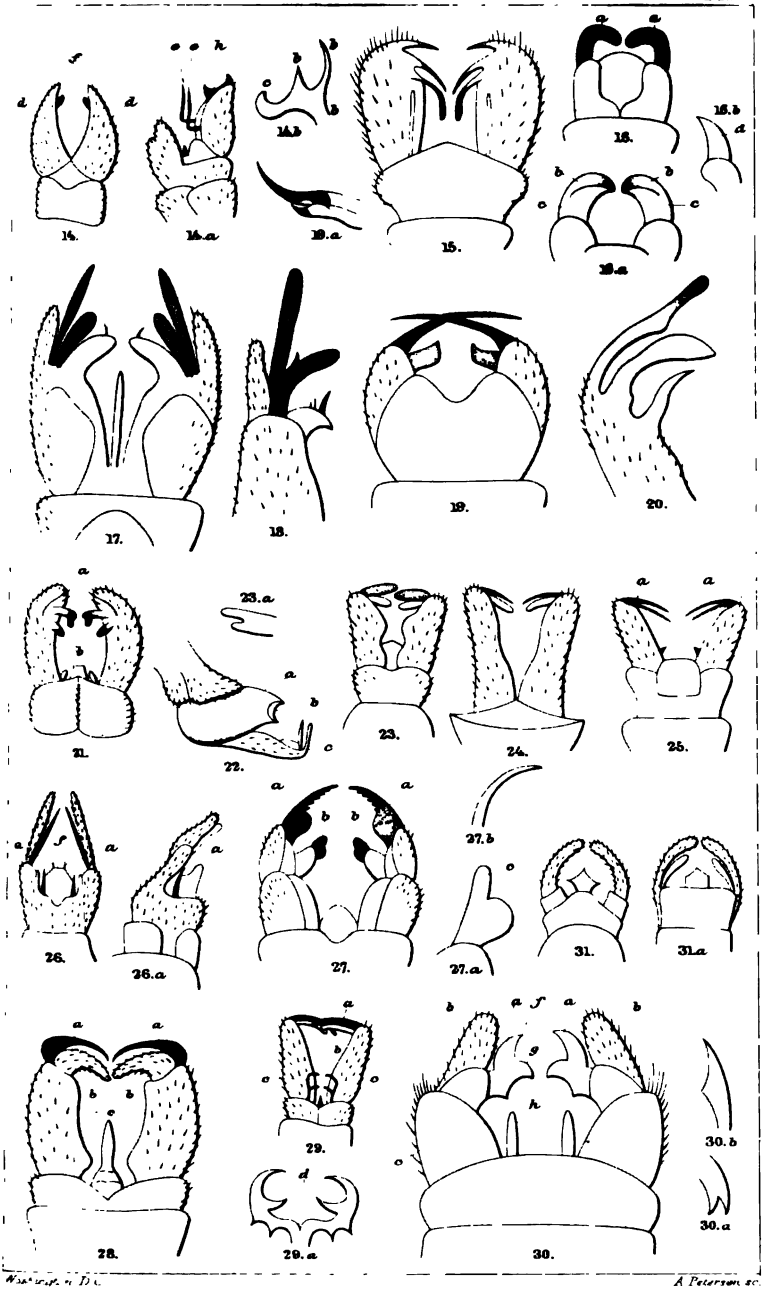

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SMITHSONIAN MISCELLANEOUS COLLECTIONS.

189

CATALOGUE

OF THE

ORTHOPTERA

OF

NORTH AMERICA

DESCRIBED PREVIOUS TO 1867.

PREPARED FOR THE SMITHSONIAN INSTITUTION

BY

SAMUEL H. SCUDDER.

WASHINGTON:
SMITHSONIAN INSTITUTION.
OCTOBER, 1868.

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THIS Report upon the present state of knowledge of the Orthoptera of North America and the West Indies, has been prepared by Mr. S. H. Scudder, at the request of this Institution. The work is designed to call attention to a much neglected order of our insects, and to facilitate their study by the student of Entomology.

The Institution proposes at some future time, to publish Monographs of the Orthoptera of this Country, and, in view of this, would be pleased to receive specimens from any quarter which may serve as material for investigation.

JOSEPH HENRY,
Secretary S. I.

ACCEPTED FOR PUBLICATION, JULY, 1867.

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PREFACE.

In preparing this Catalogue, at the request of the Smithsonian Institution, for the benefit of those who wish to examine our native Orthoptera, I have adopted a purely alphabetical arrangement. The list is not in any sense a synonymical one, involving the expression of personal views, but a hand-book for the student, in which is collected every reference to any species of Orthoptera stated to have been found on the continent of North America or in the West Indies—a groundwork upon which he may erect a superstructure of his own.

It would be difficult to extend its scope and retain uniformity of design without making it a complete synonymical list, scarcely differing from an index to an elaborate monograph, and necessitating nearly all the labor which that would require. Such a monograph I am preparing for the Smithsonian Institution, but the earlier publication and distribution of this list will assist me to obtain material for my purpose, and further the interests of science, by calling attention to this neglected group of insects.

The list furnishes an index to the exact names given to the insects in the original descriptions; if an author has described the same species, at different times, under different generic or specific names, although confessedly synonymous, they will not be found together, but distributed through the book in alphabetical order; so, too, the species of Linné and Fabricius are given under the ancient genera in which these authors placed them and not under the modern ones to which they have since been referred. When an author has used sub-genera, retaining the generic name in connection with the specific, as Burmeister, De Haan and de Saussure have frequently done, the specific will be placed under the generic

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name, the name of the sub-genus enclosed in brackets, and under the sub-genus will be found a reference to the genus; for example: under the genus *Phalangopsis* we find the species *gracilipes*, which was referred by Haldeman to the sub-genus *Daihinia*; this is made clear in the following way:—

Phalangopsis.

gracilipes [Daihinia] HALD. Proc. Amer. Ass. Adv. Sc. II, 346, *Penn.*

while under the genus *Daihinia*, after the mention of the different species, will be found the words, *See also Phalangopsis.*

Great pains have been taken to give the localities in full and to include in the list all references to such general localities as "America" or "the Indies," even when it was uncertain whether *North* America or the *West* Indies — the field embraced in my scheme — was intended. References to "meridional" America are also included, because authors have frequently embraced in this term Honduras and other parts of Central America. I have excluded every case where no reference to my field was made, even if subsequent investigations proved that the insect occurred within those limits or the name itself suggested the locality. *Œdipoda carolina* presents an exaggerated instance of this kind. Stoll' figured the insect under the name of *Locusta carolina*, but did not state where it was found; this is indicated by the name, but I have omitted reference to it and similar cases, for the sake of making the work strictly one of compilation.

In the sequence of authorities under each specific name, a chronological arrangement has been attempted, but works quoted from a single author will succeed one another.

Finally, to assist the young naturalist in the more ready use of the list, I have added a tabular view of an Orthopteran System, derived mainly from Burmeister's Handbuch der Entomologie, but including only the genera mentioned in this list. I have, however, altered the sequence of the families to what I conceive to be a more natural method.

SAMUEL H. SCUDDER.

Boston Society of Natural History,
Boston, Mass., July, 1867.

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[1] The Author's proof copy of this work was shown to me in Paris by M. Lucas, of the Jardin des Plantes. The signatures bore the impress of the printer's stamp as follows:—"Imprimerie de Fain. Rue Racine No. 2, 2e Auteur." In the middle of each stamp was written the date at which the impression was sent, showing that the whole work was printed in 1838, between the 20th of July and the 20th of December. The title-page also bore the printed date, 1838.

Burmeister's Handbuch II, II (containing the Orthoptera), has always been granted priority of publication over Serville's Orthoptères; but while the title-page of that portion of Burmeister's second volume bears the date of 1838, the first half (on the Neuroptera) is dated 1839. These dates compared with the completion of Serville's work late in 1838, seem to throw some doubt upon the priority of authority in the two cases. The time of the actual publication of Burmeister's Orthoptera may perhaps be decided by reference to the periodicals of the day.

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CATALOGUE

OF

NORTH AMERICAN ORTHOPTERA.

Acanthoderus.

adumbratus [Xylodus] Sauss. Orthopt. nov. amer. I, 4;—Ib. Rev. et Mag. de Zool. 1859, 62, *Porto Rico.*—[Xylodus] Gerst. Archiv f. Nat. XXVI, II, 404;—Ib. Bericht, 1859–60, 48, *Porto Rico.*

cornutus Burm. Handb. d. Entom. II, 569, *Aus Westindien von St. Thomas.*—Guér. Sagra, Hist. nat. de Cuba, 351, *Cuba, St. Thomas et Martinique.*—Westw. Catal. Orthopt. 56, *In Insula St. Thomas.* See also *Phasma cornutum.*

mexicanus Sauss. Orthopt. nov. amer. I, 4;—Ib. Rev. et Mag. de Zool. 1859, 62, *Mexico.*—Gerst. Archiv f. Nat. XXVI, II, 404;—Ib. Bericht, 1859–60, 48, *Mexiko.*

rosarius Westw. Catal. Orthopt. 56, *America meridionalis?*
See also Phasma.

Acanthodis.

aquilina Serv. Ann. Sc. Nat. XXII, 151, *Indes.*—Ib. Orthopt. 451, *Amérique méridionale, Cayenne.*—Blanch. Hist. nat. Ins. III, 21, *Amérique méridionale.*

azteca Sauss. Orthopt. nov. amer. I, 10;—Ib. Rev. et Mag. de Zool. 1859, 206, *Mexico.*—Gerst. Archiv f. Nat. XXVI, II, 405;—Ib. Bericht, 1859–60, 49, *Mexiko.*

coronata Serv. Ann. Sc. Nat. XXII, 151, *Indes.*

Imhoffiana [Calamoptera] Sauss. Orthopt. nov. amer. II, 5;—Ib. Rev. et Mag. de Zool. 1861, 130, *Mexico.*—[Calamoptera] Gerst. Archiv f. Nat. XXVIII, II, 316;—Ib. Bericht, 1861, 44, *Mexiko.*

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macrocera FITCH, Trans. N. Y. St. Agric. Soc. XVI, 506;—IB. 3d -5th Rep. 3d Rep. 171, *Acapulco, Mexico.*

mexicana SAUSS. Orthopt. nov. amer. I, 9;—IB. Rev. et Mag. de Zool. 1859, 206, *Tellus mexicana.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexiko.*

specularis SERV. Ann. Sc. Nat. XXII, 151, *Amérique.*

tolteca SAUSS. Orthopt. nov. amer. I, 10;—IB. Rev. et Mag. de Zool. 1859, 206, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexiko.*

See also LOCUSTA.

Acanthops.

aztecus SAUSS. Orthopt. nov. amer. I, 2;—IB. Rev. et Mag. de Zool. 1859, 60, *Mechoacan.*—GERST. Archiv f. Nat. XXVI, II, 402;—IB. Bericht, 1859–60, 46, *Mexiko.*

mexicanus SAUSS. Orthopt. nov. amer. I, 2;—IB. Rev. et Mag. de Zool. 1859, 60, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 402;—IB. Bericht, 1859–60, 46, *Mexiko.*

See also MANTIS.

Acheta.

abbreviata HARR. Treat. Ed. 1841–2, 122; Ed. 1852, 133; Ed. 1862, 152, fig. 69, *Massachusetts.*—ERICHS. Archiv f. Nat. IX, II, 226;—IB. Bericht, 1842, 82, *Massachusetts.*—FITCH, Amer. Journ. Agric. and Sc. VI, 146, *New York.*—EMM. Agric. of N. Y. V, 143, *New York.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 442, *Illinois.*

arachnoides DUNC. Introd. Entom. 248, pl. vi, fig. 1, *Jamaica.*—ERICHS. Archiv f. Nat. VII, II, 196;—IB. Bericht, 1840, 52, *Jamaica.*

assimilis FABR. Syst. Entom. 280, *Jamaica.*—IB. Spec. Ins. I, 354, *In Americæ meridionalis insulis.*—IB. Entom. Syst. II, 29;—IB. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *Jamaica.*—BILLB. Enum. Ins. 65, *Ind. occ.* See also *Gryllus assimilis.*

bipunctata ? HARR. Hitchc. Rep. 2d Ed. 576;—IB. Catal. 56, *Mass.* See also *Gryllus bipunctatus.*

brevipennis [Gryllotalpa] JAEG. N. Amer. Ins. Ed. 1854, 164, *N. America.*

crucis FABR. Mant. Ins. I, 232;—IB. Entom. Syst. II, 32, *Insula St. Crucis.*—IB. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *Ind.* See also *Gryllus crucis.*

cylindrica HARR. Hitchc. Rep. 2d Ed. 576;—IB. Catal. 56, *Mass.*

domestica JAEG. N. Amer. Ins. Ed. 1854, 161; Ed. 1859, 115, *N. America.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 443, *Illinois.*

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exigua SAY, Journ. Acad. Nat. Sc. Philad. IV, 309;—IB. Entom. of N. Amer. Ed. Leconte, II, 238, *Missouri.*

flavipes FABR. Entom. Syst. II, 30, *Insula St. Thomas.* — IB. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *St. Thomas.* See *Gryllus flavipes.*

gigas RŒM. Gen. Ins. 53, tab. viii, fig. 8, *America.* See also *Gryllus gigas.*

gryllotalpa FABR. Syst. Entom. 279;—IB. Entom. Syst. II, 28; — IB. Spec. Ins. I, 353, *In Europæ, Americæ borealis cultis.*—IB. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *Eur. Am.*—JAEG. N. Amer. Ins. Ed. 1859, 117, *N. America.* See also *Gryllus gryllotalpa.*

guadeloupensis FABR. Entom. Syst. II, 32, *Guadeloupe.* See also *Gryllus guadeloupensis.*

hospes FABR. Syst. Entom. 281;—IB. Spec. Ins. I, 355;—IB. Entom. Syst. II, 32;—IB. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *America.* See also *Gryllus hospes.*

marginata THOMAS, Trans. Ill. St. Agric. Soc. V, 444, *Illinois.*

membranacea WESTW. Drury, Ins. II, 91, pl. xliii, fig. 2, *Bay of Honduras, Musquito Shore.*

minuta FABR. Syst. Entom. 282, *America.* — IB. Spec. Ins. I, 355, *In America meridionali.*—IB. Entom. Syst. II, 33;—IB. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *America.* See also *Gryllus minutus.*

monstrosa FABR. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *Ind.*—BILLB. Enum. Ins. 65, *Ind.*

nigra HARR. Treat. Ed. 1841–2, 123; Ed. 1852, 134; Ed. 1862, 152, *Massachusetts.* — ERICHS. Archiv f. Nat. IX, II, 222;—IB. Bericht, 1842, 82, *Massachusetts.* — FITCH, Amer. Journ. Agric. and Sc. VI, 146, *New York.*—JAEG. N. Amer. Ins. 1854, 160; 1859, 113, *N. America.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 443, *Illinois.*

nivea HARR. Hitchc. Rep. 582;—IB. [Œcanthus] Hitchc. Rep. 2d Ed. 576;—IB. Catal. 56, *Mass.* — JAEG. N. Amer. Ins. 1854, 159, pl. v, fig. 26; 1859, 113, fig. 25, *N. America.* See also *Gryllus niveus.*

pennsylvanica UHLER, Harr. Treat. Ed. 1862, 152, *Massachusetts.*

servilis HARR. Hitchc. Rep. 2d Ed. 576;—IB. Catal. 56, *Mass.*

tripunctata HARR. Hitchc. Rep. 2d Ed. 576;—IB. Catal. 56, *Mass.*

vastatrix AFZEL. Achet. Guin. 15, *Ex Americæ sinu Honduras et litore Muskito, Freetown.*

vittata [Nemobius] HARR. Treat. Ed. 1841–2, 123; Ed. 1852, 134; Ed. 1862, 153, fig. 70, *Massachusetts.*—[Nemobius] ERICHS. Archiv f. Nat. IX, II, 226; — IB. Bericht, 1842, 82, *Mass.* — FITCH,

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Amer. Journ. Agric. and Sc. VI, 146, *New York.*—JAEG. N. Amer. Ins. 1854, 160; 1859, 113, *N. America.*

See also GRYLLUS.

ACHURUM, see TRUXALIS.

ACONTISTES, see MANTIS.

ACRIDA, see GRYLLUS.

Acridium.

alutaceum HARR. Treat. Ed. 1841-2, 139; Ed. 1852, 150; Ed. 1862, 173, *Martha's Vineyard.*—ERICHS. Archiv f. Nat. IX, II, 229; —IB. Bericht, 1842, 85, *Mass.*—SCUDD. Bost. Journ. Nat. Hist. VII, 466, *Martha's Vineyard, Conn.*

americanum SCUDD. Bost. Journ. Nat. Hist. VII, 466, *N. Carolina, Southern States, Florida, Alabama, Texas, Southern Illinois.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 448, 452, *Illinois.*

annulatum OLIV. Encycl. méth. VI, 235, *Amérique méridionale.*

arenosum [Tetrix] DE HAAN, Bijdr. Kenn. Orthopt. 143, *Tennessee.*

bivittatum [Opsomala] DE HAAN, Bijdr. Kenn. Orthopt. 144, *Carolina.*—[Caloptenus] UHLER, Harr. Treat. Ed. 1862, 174, *New England and western sections of the Union.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 449, *Illinois.*

Borckii [Podisma] STÅL. Orthopt. Eug. Resa, 332, *California, San Francisco.*—[Podisma] GERST. Archiv f. Nat. XXVIII, II, 318;—IB. Bericht, 1861, 46, *California.*

carolinum DE GEER, Mém. III, 491, pl. xlvii, figs. 2, 3, *Amérique septentrionale et en particulier la Caroline et la Pensylvanie.*—GÖZE, De Geer, Gesch. Ins. III, 319, tab. xli, figs. 2, 3, *In nordlichen Amerika.*—OLIV. Encycl. méth. VI, 225, *Amérique septentrionale.*—(carolinianum) PAL. DE BEAUV. Insectes, 147, pl. iv, fig. 6, *Caroline du Sud.*—HAHN, Icon. Orthopt. tab. A. Genus Acridium, fig. 3, *America.*—[Œdipoda] DE HAAN, Bijdr. Kenn. Orthopt. 143, *Tennessee.*

centurio [Rhomalea] DE HAAN, Bijdr. Kenn. Orthopt. 144, *Carolina.*

clavuligerum [Oxya] SERV. Orthopt. 676, pl. xiv, fig. 11, *Amérique septentrionale.*—DE HAAN, Bijdr. Kenn. Orthopt. 144, *Carolina.*

coloratum BURM. Germ. Zeitsch. f. Entom, II, 51, *Amerika.*—SERV. Orthopt. 674, *Une partie de l'Amérique voisine de la Caroline du Sud.*—DE HAAN, Bijdr. Kenn. Orthopt. 144, *Carolina.*

compressum THUNB. Nov. Act. Upsal. VII, 162, *In insula Jamaica.*—GERM. Germ. Mag. d. Entom. III, 408, *Jamaica.*

cristatum LAM. Hist. nat. Anim. sans Vert. IV, 241; 2e Ed. IV, 443; 3e Ed. II, 152, *Amérique méridionale.*—SERV. Ann. Sc. Nat. XXII, 283, *Amérique.*—IB. Orthopt. 650, *Amérique méríd-*

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ionale, Cayenne principalement.—FISCH. W. Index Orthopt. 15;—IB. Bull. Soc. Imp. Nat. Mosc. XIX, II, 480, *Am. Mer.*—FITCH, Trans. N. Y. St. Agric. Soc. XVI, 507; —IB. 3d–5th Rep. 3d Rep. 172, *Tropical America.*

cubense SAUSS. Orthopt. nov. amer. II, 14;—IB. Rev. et Mag. de Zool. 1861, 163, *Cuba.*

cucullatum [Tetrix] DE HAAN, Bijdr. Kenn. Orthopt. 143, *Tennessee.*

cyanipes OLIV. Encycl. méth. VI, 228, *Amérique méridionale.*

damnificum SAUSS. Orthopt. nov. amer. II, 14;—IB. Rev. et Mag. de Zool. 1861, 164, *America borealis, Tennessee.*—GERST. Archiv f. Nat. XXVIII, II, 317;—IB. Bericht, 1861, 45, *Tennessee.*

dentatum DE GEER, Mém. III, 496, pl. xlii, fig. 3, *Indes.*

differentiale UHLER, Thomas, Trans. Ill. St. Agric. Soc. V, 450, *Illinois.*

discoideum [Œdipoda] DE HAAN, Bijdr. Kenn. Orthopt. 143, *Tennessee.*

dux OLIV. Encycl. méth. VI, 215, pl. cxxvi, fig. 1, *Amérique méridionale à la baie de Honduras.*—SERV. Ann. Sc. Nat. XXII, 283, *Amérique méridionale, Brésil.*—FITCH, Trans. N. Y. St. Agric. Soc. XVI, 507;—IB. 3d–5th Rep. 3d Rep. 172, *Tropical America.*—? FLOR, v. Siv. Antill. xii, *Honduras, Senegita.*

ensicornu DE GEER, Mém. III, 499, pl. xlii, fig. 7, *Pensylvanie.*—GÖZE, De Geer, Gesch. Ins. III, 325, Tab. xlii, fig. 7, *Pennsylvanien.*

femorale OLIV. Encycl. méth. VI, 228, *Pennsylvanie.*

femoratum [Caloptenus] DE HAAN, Bijdr. Kenn. Orthopt. 144, *Carolina.*

femur rubrum DE GEER, Mém. III, 498, pl. xlii, fig. 5, *Pennsylvanie.*—GÖZE, DeGeer, Gesch. Ins. III, 324, tab. xlii, fig. 5, *Pennsylvanien.*—HARR. Hitchc. Rep. 583; 2d Ed. 576;—IB. Catal. 56, *Mass.*—IB. Treat. Ed. 1841–2, 141; Ed. 1852, 151; Ed. 1862, 174, *United States.*—[Caloptenus] DE HAAN, Bijdr. Kenn. Orthopt. 143, *Tennessee.*—FITCH, Amer. Journ. Agric. and Sc. VI, 146, *New York.*—EMM. Agric. of N. Y. V, 146, pl. ix, fig. 4, *New York.*—UHLER, Harr. Treat. Ed. 1862, 174, *United States.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 451, 452, *United States.*

flavofasciatum SERV. Orthopt. 663, *Amérique méridionale, Brésil.*—HARR. Hitchc. Rep. 583, 2d Ed. 576;—IB. Catal. 56, *Mass.*—DE HAAN, Bijdr. Kenn. Orthopt. 143, *Tennessee.*

flavovittatum HARR. Treat. Ed. 1841–2, 140; Ed. 1852, 151; Ed. 1862, 173, *Massachusetts.*—ERICHS. Archiv f. Nat. IX, II, 229; —IB. Bericht, 1842, 85, *Mass.*—FITCH, Amer. Journ. Agric. and Sc. VI, 146, *New York.*—EMM. Agric. of N. Y. V, 147, *New York.*

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giganteum [Rhomalea] De Haan, Bijdr. Kenn. Orthopt. 143, *Tennessee.*

granulatum Kirby, Fauna Bor. Amer. IV, 251, *N. America, Lat.* 65°.—[Tetrix] De Haan, Bijdr. Kenn. Orthopt. 143, *Noord-Amerika.*—White, Rich. Arct. Search. Exp. II, 360, *Borders of Mackenzie and Slave Rivers, Fort Simpson.*

hemipterum Pal. de Beauv. Insectes, 145, pl. iv, fig. 3, *États unis d'Amérique, Caroline du Sud.*

laterale Oliv. Encycl. méth. VI, 228, *Les isles de l'Amérique méridionale.*—Say, Amer. Entom. pl. v;—Ib. Entom. of N. Amer. Ed. Leconte, I, 10, pl. v, *Georgia, East Florida.*—Thon, Entom. Archiv, I, 41, *Georgien und West-florida.*

Latreillei Fitch, Trans. N. Y. St. Agric. Soc. XVI, 507;—Ib. 3d–5th Rep. 3d Rep. 172, pl. iii, iv, *Tropical America.*

leucostomum [Locusta] De Haan, Bijdr. Kenn. Orthopt. 143, *Noord-Amerika.*

lunum Oliv. Encycl. méth. VI, 216, *Amérique méridionale.*

marginatum Oliv. Encycl. méth. VI, 229, *Pennsylvanie.*

marginicolle [Opsomala] De Haan, Bijdr. Kenn. Orthopt. 143, *Tennessee.*

micropterum Pal. de Beauv. Insectes, 146, pl. iv, fig. 4, *États unis d'Amérique, Caroline du Sud.*—[Rhomalea] De Haan, Bijdr. Kenn. Orthopt, 144, *Carolina.*—Ib. 151, *Georgia, Carolina.*

Milberti Serv. Orthopt. 649, *Amérique septentrionale.*—De Haan, Bijdr. Kenn. Orthopt. 144, *Carolina.*

miliare Oliv. Encycl. méth. VI, 218, *Amérique méridionale.*

obliteratum [Œdipoda] De Haan, Bijdr. Kenn. Orthopt. 144, *Carolina.*

obscurum Harr. Hitchc. Rep. 583; 2d Ed. 576;—Ib. Catal. 56, *Mass.*—Burm. Handb. d. Entom. II, 632, *Südkarolina.*—De Haan, Bijdr. Kenn. Orthopt. 144, *Carolina, Cuba.*—Guér. Sagra, Hist. nat. de Cuba, 356, *Cuba, Amérique septentrionale.*—Scudd. Bost. Journ. Nat. Hist. VII, 467, *Texas.*

olivaceum Serv. Orthopt. 666, *Cuba, Amérique septentrionale.*—De Haan, Bijdr. Kenn. Orthopt. 144, *Cuba.*—Guér. Sagra, Hist. nat. de Cuba, 356, *Cuba, Amérique septentrionale.*

ornatum Say, Amer. Entom. pl. v;—Ib. Entom. of N. Amer. Ed. Leconte, I, 10, pl. v, *Philadelphia.*—Thon, Entom. Archiv, I, 41, *Philadelphia.*—Hald. Amer. Journ. Sc. [2] V, 435, *Chihuahua, Santa Fé.*

oxycephalum [Tetrix] De Haan, Bijdr. Kenn. Orthopt. 143, *Tennessee.*

pelidnum [Gomphocerus] De Haan, Bijdr. Kenn. Orthopt. 144, *Carolina.*

phœnicopterum [Œdipoda] De Haan, Bijdr. Kenn. Orthopt. 144, *Carolina.*

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polymorphum [Tetrix] De Haan, Bijdr. Kenn. Orthopt. 144, *Carolina.*

punctipenne [Opsomala] De Haan, Bijdr. Kenn. Orthopt. 144, *Carolina.*

purpurascens Oliv. Encycl. méth. VI, 234, *L'île de la Trinité.*

quadrimaculatum Thunb. Nov. Act. Upsal. VII, 160, *In insula Bartholemi Americes.*—Germ. Germ. Mag. d. Entom. III, 407, *St. Barthelemy.*

rhombeum [Choriphyllum] De Haan, Bijdr. Kenn. Orthopt. 144; —[Hymenotes] Ib. Bijdr. Kenn. Orthopt. 165, *Jamaica.*

rubiginosum Harris, Scudd. Bost. Journ. Nat. Hist. VII, 467, *Cape Cod, Conn. S. Car. Southern States, Alabama.*—Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Nord Amerika.*

rusticum Oliv. Encycl. méth. VI, 228, *Les isles de l'Amérique méridionale.*—Burm. Handb. d. Entom. II, 633, *Nord Amerika.*—De Haan, Bijdr. Kenn. Orthopt. 144, *Carolina.*

Sagrai [Choriphyllum] De Haan, Bijdr. Kenn. Orthopt. 144, *Cuba.*

sanguinipes Harr. Hitchc. Rep. 583; 2d Ed. 576;—Ib. Catal. 56, *Mass.*—Serv. Orthopt. 670, *Amérique méridionale, Brésil.*

semirubrum Fitch, Trans. N. Y. St. Agric. Soc. XVI, 507;—Ib. 3d–5th Rep. 3d Rep. 172, *Tropical America.*—Sauss. Orthopt. nov. amer. II, 13;—Ib. Rev. et Mag. de Zool. 1861, 162, *In campis mexicanis.*

serratum Lam. Hist. nat. Anim. sans Vert. IV, 241; 2e Ed. IV, 443; 3e Ed. II, 152, *Cap de Bonne Espérance, l'Amérique méridionale.*

sordidum [Œdipoda] De Haan, Bijdr. Kenn. Orthopt. 143, *Tennessee.*

speciosum Burm. Germ. Zeitschr. f. Entom. II, 51, *Amerika.*

spretum Uhler, Thomas, Trans. Ill. St. Agric. Soc. V, 450, (spretis!) *Illinois.*

sulphureum Oliv. Encycl. méth. VI, 227, *Amérique septentrionale.*—Pal. de Beauv. Insectes, 145, pl. iv, fig. 2, *États unis d'Amérique, Virginie.*—[Œdipoda] De Haan, Bijdr. Kenn. Orthopt. 143, *Tennessee.*

toltecum Sauss. Orthopt. nov. amer. II, 14;—Ib. Rev. et. Mag. de Zool. 1861, 163, *Mexico temperata.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

torvum Harr. Hitchc. Rep. 2d Ed. 576;—Ib. Catal. 56, *Mass.*

tuberculatum Pal. de Beauv. Insectes, 145, pl. iv, fig. 1, *États unis d'Amérique.*

variegatum Oliv. Encycl. méth. VI, 222, *Amerique méridionale.*

varipes [Opsomala] De Haan, Bijdr. Kenn. Orthopt. 144, *Carolina.*

Velasquezii Nieto, Nouv. Orthopt. 2;—Ib. Rev. et. Mag. de Zool. 1857, pl. xii, *Dans les bois des Haciendos, du Potrero et de San*

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Francisco, État de Vera Cruz.—Gerst. Archiv f. Nat. XXIV, II, 345;—Ib. Bericht, 1857, 153, *Vera Cruz.*—Lucas, Ann. Soc. Ent. France, [3] IV, lxvii, *Mexique, particulièrement les bois des Haciendos, du Potrero et de San Francisco, aux environs de Cordova (État de Vera Cruz).*

verrucosum De Geer, Mém. III, 486, pl. xl, fig. 6, *Amérique.*—Göze, De Geer, Gesch. Ins. III, 315, tab. xl, fig. 6, *Amerika.*

verruculatum [Locusta] De Haan, Bijdr. Kenn. Orthopt. 143, *Noord-Amerika.*

virginianum Oliv. Encycl. méth. VI, 224, *L'Amérique septentrionale, Virginie.*—[Œdipoda] De Haan, Bijdr. Kenn. Orthopt. 143, *Tennessee.*

viridifasciatum Göze, De Geer, Gesch. Ins. III, 325, tab. xlii. fig. 6, *Pennsylvanien.*

vitreipenne [Oxya] De Haan, Bijdr. Kenn. Orthopt. 144, *Carolina.*

vittatum Pal. de Beauv. Insectes, 146, pl. iv, fig. 5, *A la côte occidentale d'Afrique à St. Dominque et dans les États unis d'Amérique.*

xanthopterum [Œdipoda] De Haan, Bijdr. Kenn. Orthopt. 143, *Tennessee.*

See also Gryllus.

Anabrus.

Haldemanii Girard, Marcy, Expl. Red River, Ed. 1853, 259, pl. xv, figs. 5–8; Ed. 1854, 248, pl. xv, figs. 5–8, *Red River.*—Gerst. Archiv f. Nat. XX, II, 246;—Ib. Bericht, 1853, 58, *Louisiana.*

purpurascens Uhler, Proc. Entom. Soc. Philad. II, 550, *Minnesota, Texas, Washington Territory.*—Dallas, Zool. Record, I, 573, *Minnesota, Washington Territory.*

simplex Hald. Stansb. Expl. Utah, 372, pl. x, fig. 4, *Utah.*—Schaum, Archiv f. Nat. XIX, II, 271;—Ib. Bericht, 1852, 130, *Utah.*

Anaplecta.

dorsalis Brunn. Blatt. 63, *Portorico.*

fallax Sauss. Orthopt. nov. amer. III, 2;—Ib. Rev. et. Mag. de Zool. 1862, 163.—Ib. Orthopt. Amér. moy. 51, *Guatemala.*—Brunn. Blatt. 66, *Guatemala.*

fulgida Sauss. Orthopt. nov. amer. III, 2;—Ib. Rev. et Mag. de Zool. 1862, 163;—Ib. Orthopt. Amér. moy. 50, *Guatemala.*—Brunn. Blatt. 66, *Guatemala.*

Ancistrogaster.

spinax Dohrn, Entom. Zeitschr. Stett. XXIII, 229, taf. i, fig. 1, *Mexico.*—Gerst. Archiv f. Nat. XXIX, II, 359;—Ib. Bericht, 1862, 45, *Mexiko.*

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Anisomorpha.

buprestoides GRAY, Synops. Phasm. 19, *Georgia.*—BURM. Handb. d. Entom. II, 570, *Georgien.*—WESTW. Introd. Class. Ins. I, 434, *America.*—IB. Catal. Orthopt. 17, *Georgia.*—UHLER, Say, Entom. of N. Amer. Ed. Leconte, I, 198, *Falls of Niagara, Missouri River.*—IB. Harr. Treat. Ed. 1862, 146, *Florida and Southern States.* See also *Phasma buprestoides.*

ferruginea GRAY, Synops. Phasm. 18, *Carolina.*—BURM. Handb. d. Entom. II, 570, *Carolina.*—WESTW. Catal. Orthopt. 16, *Carolina, Virginia.* See also *Phasma ferruginea.*

See also PHASMA.

Anophelepis.

Scythrus WESTW. Catal. Orthopt. 68, pl. ii, fig. 3, *Mexico.*

vittata WESTW. Catal. Orthopt. 68, pl. iii, fig. 3, *Mexico.*

Anostostoma.

tolteca SAUSS. Orthopt. nov. amer. II, 5;—IB. Rev. et Mag. de Zool. 1861, 130, *Mons Orizaba, Mexico.*—GERST. Archiv f. Nat. XXVIII, II, 316;—IB. Bericht, 1861, 44, *Orizaba.*

See also LOCUSTA.

Apterygida.

ruficeps DOHRN, Entom. Zeitschr. Stett. XXIII, 231, *Cordova.*—GERST. Archiv f. Nat. XXIX, II, 359;—IB. Bericht, 1862, 45, *Mexiko.*

Arcyptera.

gracilis SCUDD. Can. Nat. VII, 286, *Red River Settlements, British America.*—IB. Bost. Journ. Nat. Hist. VII, 463, *Maine, Red River Settlements.*—GERST. Archiv f. Nat. XXIX, II, 358;—IB. Bericht, 1862, 44, *Nord Amerika.*

linesta SCUDD. Bost. Journ. Nat. Hist. VII, 462, *Mass.*—GERST. Archiv f. Nat. XXIX, II, 358;—IB. Bericht, 1862, 44, *Nord Amerika.*

platyptera SCUDD. Bost. Journ. Nat. Hist. VII, 463, *New England.*—GERST. Archiv f. Nat. XXIX, II, 358;—IB. Bericht, 1862, 44, *Nord Amerika.*

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Bacteria.

Ætolus Westw. Catal. Orthopt. 27, pl. xxii, fig. 3, *Mexico.*

arumatia Gray, Synops. Phasm. 16, *In India occidentali.*—Westw. Catal. Orthopt. 22, pl. xxiii, fig. 4, *In India occidentali, Guadeloupe.*

azteca [Bacunculus] Sauss. Orthopt. nov. amer. I, 3;—Ib. Rev. et Mag. de Zool. 1859, 62, *Littus mexicanum.*—Gerst. Archiv f. Nat. XXVI, II, 404;—Ib. Bericht, 1859–60, 48, *Mexiko.*

baculus [Bacunculus] Sauss. Orthopt. nov. amer. I, 3;—Ib. Rev. et Mag. de Zool. 1859, 62, *America.*—Gerst. Archiv f. Nat. XXVI, II, 404;—Ib. Bericht, 1859–60, 48, *Amerika.*

bicornis Gray, Synops. Phasm. 16, *In India occidentali.*—Burm. Handb. d. Entom. II, 566, *Westindien und Surinam.*—Westw. Catal. Orthopt. 23, *In America australi et India occidentali.*

calamus Serv. Ann. Sc. Nat. XXII, 64, *D'Amérique.*—Gray, Synops. Phasm. 17, *In India occidentali.*—Westw. Catal. Orthopt. 20, *In insula St. Crucis, Surinam, Brazil.* See also *Phasma calamus.*

calcarata Burm. Handb. d. Entom. II, 566, *Mexiko.* See also *Phasma calcaratum.*

Clinteria Westw. Catal. Orthopt. 27, pl. xxv, fig. 9, *Am. merid.*

cornuta [Bacunculus] Sauss. Orthopt. nov. amer. II, 3;—Ib. Rev. et Mag. de Zool. 1861, 128, *Mexico calida.*—Gerst. Archiv f. Nat. XXVIII, II, 311;—Ib. Bericht, 1861, 39, *Mexiko.*

crudelis Westw. Catal. Orthopt. 24, *In India occidentali.*

cubaensis Westw. Catal. Orthopt. 26, *Cuba.* See also *Phasma cubaense.*

Dryas Westw. Catal. Orthopt. 27, *St. Domingo.*

faunus Westw. Catal. Orthopt. 28, *Am. merid.*

ferula Serv. Ann. Sc. Nat. XXII, 64, *Guadeloupe.*—Burm. Handb. d. Entom. II, 564, *Westindien.*

filiformis Serv. Ann. Sc. Nat. XXII, 64, *L'Amérique méridionale.*—Gray, Synops. Phasm. 17, *In India occidentali.*—Westw. Catal. Orthopt. 22, *In Indiæ occidentalis insulis.*

gracilis Westw. Catal. Orthopt. 28, *La Guayra.*

Haita Westw. Catal. Orthopt. 25, pl. xxv, figs. 5, 6, *St. Domingo.*

linearis ?Gray, Synops. Phasm. 17, *In India occidentali.*—Westw. Drury, Ins. I, 123, pl. ii, fig. 3, *Antigua.*—Ib. Catal. Orthopt. 24, *In India occidentali, Antigua.*—Burm. Handb. d. Entom. II, 567, *Westindien, Portorico und St. Thomas.*—Guér. Sagra, Hist. nat. de Cuba, 350, *Antilles.* — Gosse, Alab. 275, *Alabama.* See also *Phasma lineare.*

mexicana Westw. Catal. Orthopt. 25, *Mexico.* See also *Phasma mexicanum.*

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rosaria PERCH. Guér. et Perch. Gen. Ins. 5e Livr. No. 3, pl. v, *L'Amérique méridionale.?*

Sayii [Bacunculus] BURM. Handb. d. Entom. II, 566, *Nordamerika von Pennsylvanien bis Südkarolina.*—CHARP. Orthopt. descr. tab. vi, *America septentrionalis.*

spinosa BURM. Handb. d. Entom. II, 567, *St. Domingo von Prinzenhafen.*

striata BURM. Handb. d. Entom. II, 567, *Mexiko.*—WESTW. Catal. Orthopt. 28, *Mexico.* See also *Phasma striatum.*

tolteca [Bacunculus] SAUSS. Orthopt. nov. amer. I, 3;—IB. Rev. et Mag. de Zool. 1859, 62, *Montes mexicani.*—GERST. Archiv f. Nat. XXVI, II, 404;—IB. Bericht, 1859–60, 48, *Mexiko.*

tridens BURM. Handb. d. Entom. II, 567, *Mexiko von Oaxaka.*—WESTW. Catal. Orthopt. 27, *Mexiko, Oaxaca.* See also *Phasma tridens.*

See also PHASMA.

Bacunculus.

femoratus UHLER, Harr. Treat. Ed. 1862, 146, *United States east of the Mississippi.*

Sayi THOMAS, Trans. Ill. St. Agric. Soc. 441, *Illinois.*

See also BACTERIA.

Batrachidea.

carinata SCUDD. Bost. Journ. Nat. Hist. VII, 479, *Massachusetts.*—GERST. Archiv f. Nat. XXIX, II, 358;—IB. Bericht, 1862, 44, *Massachusetts.*

cristata SCUDD. Bost. Journ. Nat. Hist. VII, 478, *Mass. Me. N. H. Conn.*—GERST. Archiv f. Nat. XXIX, II, 358;—IB. Bericht, 1862, 44, *Massachusetts.*

Blabera.

atropos SERV. Orthopt. 77, *Saint Domingue.*—SAUSS. Orthopt. Amér. moy. 233, *Les Antilles, Cuba et la côte chaude du Mexique.*—BRUNN. Blatt. 375, tab. xii, fig. 55, *Jamaique, Venezuela, Colombie, Brésil.* See also *Blatta atropa.*

craniipes BURM. Handb. d. Entom. II, 316, *Kuba.*

cubensis SAUSS. Blatt. nov. 29;—IB. Rev. et Mag. de Zool. 347, *Cuba.*—IB. Orthopt. Amér. moy. 236, *Les Antilles, Cuba.*

deplanata SAUSS. Blatt. nov. 30;—IB. Rev. et Mag. de Zool. 1864, 348, *Antillae.*—IB. Orthopt. Amér. moy. 250, *Les Antilles, Cuba.*—DALLAS, Zool. Record, I, 572, *W. Indies.*—GERST. Archiv f. Nat. XXX, II, 431;—IB. Bericht, 1863–4, 125, *Antillen.*

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discoidalis SERV. Orthopt. 76, pl. i, fig. 6, *Saint Domingue.*

ferruginea SAUSS. Orthopt. Amér. moy. 41, *Mexique.*—BRUNN. Blatt. 377, *Mexique, Acapulco.*

fraterna SAUSS. Orthopt. Amér. moy. 241, *L'Amerique du Sud (les Antilles, Cuba?).*

fumigata SAUSS. Orthopt. Amér. moy. 244, *Cuba.*—GERST. Archiv f. Nat. XXIV, II, 348;—IB. Bericht, 1857, 156, *Cuba.*—BRUNN. Blatt. 381, *Havane.*

fusca BRUNN. Blatt. 376, *Brésil, Chile, Cuba.*

gigantea FISCH. Orthopt. Europ. 118, *In America meridionali degens cum navibus ex India occidentali in Angliam advecta est.*—SAUSS. Orthopt. Amér. moy. 236, *L'Amérique méridionale, Brésil, Guyanne.* See also *Blatta gigantea.*

limbata BURM. Handb. d. Entom. II, 316, *Mexiko.*

luctuosa STÅL. Öfv. Kongl. Vet. Akad. Förhandl. 1855, 351, *Mexico.*—GERST. Archiv f. Nat. XXII, II, 211;—IB. Bericht, 1855, 91, *Mexiko.*

maderæ SELLS, Trans. Entom. Soc. Lond. III, 104, *Jamaica.*

marmorata BRUNN. Blatt. 378, *St. Domingue.*

mexicana SAUSS. Orthopt. nov. amer. III, 17;—IB. Rev. et Mag. de Zool. 1862, 233, *Mexico.*—IB. Orthopt. Amér. moy. 234, *Les parties chaudes du Mexique, commune dans la Cordillière orientale, Tampico, Tuxpan, Cordoba, etc. N. Orleans.*

minor SAUSS. Orthopt. Amér. moy. 238, *L'Amérique meridionale, le Brésil (Cuba?).*

Sulzeri GERST. Archiv f. Nat. XXIV, II, 348;—IB. Bericht, 1857, 156, *Cuba.*—SAUSS. Orthopt. Amér. moy. 239, pl. ii, fig. 39, *Cuba.*—BRUNN. Blatt. 380, *Surinam, Cuba.* See also *Blatta Sulzeri.*

Thunbergii SAUSS. Orthopt. Amér. moy. 246, *Cuba.*

trapezoidea BURM. Handb. d. Entom. II, 316, *Mexiko.*—SAUSS. Orthopt. Amér. moy. 240, *Mexique.*—BRUNN. Blatt. 374, *Mexique, Cuba.*

varians SERV. Orthopt. 78, *Cuba.*

See also BLATTA.

Blatta.

ægyptiaca DRURY, Illustr. Nat. Hist. II, 67, pl. xxxvi, fig. 3, *Jamaica.*—[Polyphaga] ? WESTW. Drury, Ins. II, 71, pl. xxxvi, fig. 3, *Jamaica, Egypt.*

Alcarazzas SERV. Orthopt. 90, *Amérique.*

americana MORT. Phil. Trans. XLV, 163, *Carolina.*—LINN. Syst. Nat. 10th Ed. I, 434, *America.*—IB. Syst. Nat. 12th Ed, II, 687; 13th Ed. I, 687, *America, in Gallia australi.*—MÜLL. Linn. Natursyst. V, 403, *Westindische Kackerlack.*—FABR.

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Syst. Entom. 271, *America.*—Ib. Spec. Ins. I, 342, *America; nuper incipit in Europa saccharo allata.*—Ib. Entom. Syst. II, 7, *America.*—Goeze, Entom. Beytr. II, 7, *Der braune amerikanische Kakerlak.*—Gmel. Linn. Syst. Nat. IV, 2042, *America, cum saccharo in Europam delata.*—Browne, Nat. Hist. Jamaica, 433 (Blatta 2), Index, iii, iv, *America.* — Vill. Linn. Entom. Faun. Suec. I, 428, *America, Gallia australi.*—Turt. Syst. Nat. Linn. II, 528, *America; has lately appeared in Europe.*—Latr. Hist. nat. Crust. et Ins. XII, 96, pl. xciv, fig. 1, *Portée de l'Amérique méridionale en Europe.*—Ib. Cuv. Règne Anim. Ed. 1817, III, 371; Ed. 1829, V, 175; Ed. Disc. Ins. II, 10, pl. lxxvii, figs. 4, 4ª–4ᶠ, *Amérique.*—Ib. Cuv. Règne Anim. Ed. M'Murtrie, IV, 7, *America.*—Lam. Hist. nat. Anim. sans Vert. IV. 263; 2ᵉ Ed. IV, 462; 3ᵉ Ed. II, 159, *L'Amérique, et se trouve en Europe.*—Billb. Enum. Ins. 63, *America.*—Serv. Dict. class. d'Hist. nat. II, 342, *Originaire de l'Amérique méridionale, et des Antilles, d'où elle a été importée d'abord dans les contrées chaudes de l'Afrique et de l'Asie et delà dans le reste du monde.*—? Perty. De Ins. in Del. Anim. Artic. 19, *In India occidentali.* — Voigt. Thierreich, V, 353, *Amerika.*—Harr. Hitchc. Rep. 2d Ed. 576;—Ib. Catal. 56, *Mass.*—Aud. et Brullé, Hist. nat. Ins. IX, 53, *Dans différentes parties des deux continents.*—Wils. Encycl. Brit. 8th Ed. IX, 156;—Ib. Treat. Ins. 190, *South America, Antilles, Asia, Africa, seaport towns of Europe.*—Oken, Allg. Naturg. V, C, 1506, *America.*—Lherm. Ann. Soc. Entom. France, [1] VI, 506, *Guadeloupe.* — [Kakkerlac] Blanch. Hist. nat. Ins. III, 6, *Univers.*—[Periplaneta] Guér. Sagra, Hist. nat. de Cuba, 339, *Cuba.*—Jones, Nat. Berm. 110, *Bermuda.*

angustata Latr. Humb. et Bonpl. Rec. d'Obs. Zool. I, 146, pl. xv, fig. 9, *Vera Cruz.*—Perty, De Ins. in Del. Anim. Artic. 19, *In domibus urbis Mexicanæ Vera Cruz.*—Zinck. Germ. Mag. d. Entom. I, ii, 109, *Vera Cruz.*

asellus Thunb. Mém. Acad. St. Petersb. X, 277, tab. xiv, *Ex America meridonali, et imprimis e Brasilia.*

atropos [Blabera] Guér. Sagra, Hist. nat. de Cuba, 333, *Havane.*

australasiæ [Periplaneta] Guér. Sagra, Hist. nat. de Cuba, 340, *Cuba, Guatimala.*

bicolor Pal. de Beauv. Insectes, pl. iᵇ, fig. 6, *Saint Domingue.*—Harr. Hitchc. Rep. 2d Ed. 576;—Ib. Catal. 56, *Mass.*

biguttata Thunb. Mém. Acad. St. Petersb. X, 276, tab. xiv, *Ex America meridionali et imprimis e Brasilia.*

bipustulata Thunb. Mém. Acad. St. Petersb. X, 279, *Ex America meridionali et imprimis e Brasilia.*

bivittata [Phyllodromia] Serv. Orthopt. 108, *Sénégal, Cap-de-Bonne-Espérance, Ile-de-France, Cuba, Perou, etc.*—[Phyllodromia]

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GUÉR. Sagra, Hist. nat. de Cuba, 346, *Cuba, Pérou, l'île de France, Cap et Sénégal.*—SAUSS. Orthopt. Amér. moy. 102, *Ceylan, Mexique; dans la Cordillière orientale du Mexique et sur son versant occidental, dans le Mechoacan, Cuba.*

borealis SAUSS. Orthopt. nov. amer. III, 4;—IB. Rev. et Mag. de Zool. 1862, 166, *America borealis.*—IB. Orthopt. Amér. moy. 96, pl. i, fig. 13, *L'Amérique du Nord.*—GERST. Archiv f. Nat. XXIX, II, 354;—IB. Bericht, 1862, 40, *Nord Amerika.*

brasiliensis LHERM. Ann. Soc. Entom. de France, [1] VI, 506, *Guadeloupe.*

brunnea THUNB. Mém. Acad. St. Petersb. X, 278, *Ex America meridionali et imprimis e Brasilia.*

buprestoides SAUSS. Orthopt. nov. amer. III, 5;—IB. Rev. et Mag. de Zool. 1862, 166;—IB. Orthopt. Amér. moy. 116, pl. i, fig. 20, *Cuba.*—GERST. Archiv f. Nat. XXIX, II, 354;—IB. Bericht, 1862, 40, *Cuba.*

Burmeisteri [Phyllodromia] GUÉR. Sagra, Hist. nat. de Cuba, 345, *Cuba.*

capitata SAUSS. Orthopt. nov. amer. III, 5;—IB. Rev. et Mag. de Zool. 1862, 167;—IB. Orthopt. Amér. moy. 114, pl. i, fig. 19, *Cuba.*—GERST. Archiv f. Nat. XXIX, II, 354;—IB. Bericht, 1862, 40, *Cuba.*

cicatricosa [Zetobora] GUÉR. Sagra, Hist. nat. de Cuba, 336, pl. xii, fig. 5, *Havane.*

cincta FABR. Mant. Ins. I, 226;—IB. Entom. Syst. II, 9, *America.*—IB. Nom. Entom. emend. Ed. 1797, 78; Ed. 1810, 78, *Am.*—GMEL. Linn. Syst. Nat. IV, 2044, *America.*—OLIV. Encycl. méth. IV, 318, *Amérique.*—TURT. Syst. Nat. Linn. II, 529, *America.*—BILLB. Enum. Ins. 163, *Amer.*

cinerea THUNB. Mém. Acad. St. Petersb. X, 277, *Ex America meridionali et imprimis e Brasilia.*

collaris [Holocompsa] GUÉR. Sagra, Hist. nat. de Cuba, 332, pl. xii, fig. 3, *Cuba, l'île Maurice.*—[Holocompsa] GERST. Archiv f. Nat. XXIV, II, 348;—IB. Bericht, 1857, 156, *Cuba.*

conspersa SERV. Orthopt. 89, *Cuba.*—[Zetobora] GUÉR. Sagra, Hist. nat. de Cuba, 339, *Cuba, Brésil.*

convexa THUNB. Mém. Acad. St. Petersb. X, 279, *Ex America meridionali et imprimis e Brasilia.*

cubensis SAUSS. Orthopt. nov. amer. III, 4;—IB. Rev. et Mag. de Zool. 1862, 165;—IB. [Phyllodromia] Orthopt. Amér. moy. 108, pl. i, figs. 14, 15, *Cuba.*—GERST. Archiv f. Nat. XXIX, II, 354;—IB. Bericht, 1862, 40, *Cuba.*

cylindrica THUNB. Mém. Acad. St. Petersb. X, 279, *Ex America meridionali et imprimis e Brasilia.*

delicatula [Phyllodromia] GUÉR. Sagra, Hist. nat. de Cuba, 346, *Cuba.*—SAUSS. Orthopt. Amér. moy. 104, pl. i, fig. 17, *Cuba.*

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diaphana FABR. Entom. Syst. II, 11, *in Am. merid. insulis.*—IB. Nom. Entom. emend. Ed. 1797, 78; Ed. 1810, 78, *Am. m.*—BURM. Handb. d. Entom, II, 496, *St. Thomas, Westindien.*—[Hololampra] SAUSS. Orthopt. Amér. moy. 95, *Des Antilles, Saint Thomas.*

discicollis BURM. Handb. d. Entom, II, 498, 1012, *Mexiko.*

domingensis PAL. DE BEAUV. Insectes, 182, pl. i[b], fig. 4, *Saint Domingue.*—HARR. Hitchc. Rep. 2d Ed. 576;—IB. Catal. 56, *Mass.*

elongata PAL. DE BEAUV. Insectes, 183, pl. i[b], fig. 5, *Saint Domingue.*—[Phyllodromia] SERV. Orthopt. 106, *Saint Domingue.*

fumigata GUÉR. Sagra, Hist. nat. de Cuba, 335, pl. xii, fig. 4, *Havane.*

germanica AUD. et BRULLÉ, Hist. nat. Ins. IX, 55, *Dans toutes les parties du monde.*—GERST. Handb. der Zool. II, 44, *Von Europa aus, über alle Welttheile verbreitet.*

gibba THUNB. Mém. Acad. St. Petersb. X, 279, *Ex America meridionali et imprimis e Brasilia.*

grossa THUNB. Mém. Acad. St. Petersb. X, 280, *Ex America meridionali et imprimis e Brasilia.*

gigantea LINN. Syst. Nat. 10th Ed. I, 424, *America.*—IB. Syst. Nat. 12th Ed. II, 687, *America, Asia.*—IB. Mus. Lud. Ulr. Reg. 106, *America.*—DRURY, Illustr. Nat. Hist. II, 66, pl. xxxvi, fig. 2, *Jamaica.*—MÜLL. Linn. Natursyst. V, 402, *America, Asia.*—FABR. Syst. Entom. 271;—IB. Entom. Syst. II, 6;—IB. Nom. Entom. emend. Ed. 1797, 78; Ed. 1810, 78, *America, Asia.*—GMEL. Linn. Syst. Nat. 13th Ed. IV, 2041, *Asia et America.*—OLIV. Encycl. méth. IV, 314, pl. cxxv, fig. 1, *Toute l'Amérique méridionale, rarement de Cayenne.*—TURT. Syst. Nat. Linn. II, 527, *America and Asia.*—LAM. Hist. nat. Anim. sans Vert. IV, 262; 2[e] Ed. IV, 462; 3[e] Ed. II, 159, *L'Amérique méridionale, Cayenne.*—KIRBY and SPENCE, Introd. Entom. 3d Ed. I, 243; 7th Ed. 140, *Asia, Africa, America.*—LHERM. Ann. Soc. Entom. France, [1] VI, 506, *Guadeloupe.*—[Blabera] WESTW. Drury, Ins. II, 71, pl. xxxvi, fig. 2, *Jamaica, America, Asia, Cayenne.*—IB. Introd. Class. Ins. I, 418, *West Indies.*—[Blaberus] DUNC. Introd. Entom. 225, pl. vii, fig. 1, *S. America, West Indian Islands.*

guttata THUNB. Kongl. Vet. Akad. nya Handl. XXXI, 188, *In insula Bartholemi.*

indica PAL. DE BEAUV. Insectes, 227, pl. ii[a], fig. 2, *Saint Domingue et les Indes orientales.*—SERV. Ann. Sc. Nat. XXII, 40, *Des Indes.*

intercepta BURM. Handb. d. Entom. II, 497, *Mexiko.*—[Ectobia] SAUSS. Orthopt. Amér. moy. 113, *Mexico.*

kakkerlac DE GEER, Mém. III, 535, pl. xliv, figs. 1–3, *Amérique méridionale.*—OLIV. Encycl. méth. IV, 315, *Europe et dans*

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toute l'Amérique méridionale.—Pal. de Beauv. Insectes, 181, pl. i[b], fig. 1, *Afrique ; îles de l'Amérique.*

lævigata Pal. de Beauv. Insectes, 228, pl. ii[a], fig. 4, *Saint Domingue.* —Serv. Orthopt. 98, *Cuba, Martinique.*—[Panchlora] Guér. Sagra, Hist. nat. de Cuba, 344, *Cuba.*—Sauss. Orthopt. Amér. moy. 99, pl. i, fig. 16, *Les Antilles ; Cuba, La Martinique, Saint Domingue.*

limbata Thunb. Mém. Acad. St. Petersb. X, 278, *Ex America meridionali et imprimis e Brasilia.*

lineata Pal. de Beauv. Insectes, 228, pl. ii[a], fig. 5, *Amérique méridionale.*

lineolata Dalm. Anal. Entom. 87, *In Americæ insulis ?*

livida Fabr. Spec. Ins. I, 341, *America, Asia.*

maderae Oliv. Encycl. méth. IV, 314, *A Madère aux Antilles et dans l'Amérique méridionale.*—Hahn, Icon. Orthopt. tab. A, Gen. Blatta, fig. 1, *Madera et Ins. St. Bartholomeæ.*—Serv. Orthopt. 87, *Madère, Ile de France, Saint Domingue.*—Blanch. Hist. nat. Ins. III, 5, *Afrique, Amérique, Indes orientales.*—[Panchlora] Guér. Sagra, Hist. nat. de Cuba, 338, *Madère, Maurice, Sénégal, Cuba.*—Jones, Nat. Berm. 110 (madarensia!), *Bermuda.*

major Pal. de Beauv. Insectes, 182, pl. i[b], fig. 2, *Afrique, îles de l'Amérique.*

mexicana Sauss. Blatt. nov. spec. 7;—Ib. Rev. et Mag. de Zool. 1864, 311, *Mexico.*—Dallas, Zool. Record, I, 571, *Mexico.*—Gerst. Archiv f. Nat. XXX, II, 430;—Ib. Bericht, 1863-4, 124, *Mexiko.*

mysteca Sauss. Orthopt. nov. amer. III, 6;—Ib. Rev. et Mag. de Zool. 1862, 167, *Mexico calida.*—Ib. [Ectobia] Orthopt. Amér. moy. 110, *Mexique, des terres chaudes de la côte de Véra Cruz.* —Gerst. Archiv f. Nat. XXIX, II, 354;—Ib. Bericht, 1862, 40, *Aus den heissen Gegenden Mexiko's.*

nivea Linn. Syst. Nat. 10th Ed. I, 434; 12th Ed. II, 688; 13th Ed. I, 688, *America.*—Drury, Illustr. Nat. Hist. II, 66, pl. xxxvi, fig. 1, *New York.*—Fabr. Syst. Entom. 272, *Amerika.*—Ib. Spec. Ins. I, 343, *In America meridionali.*—Ib. Entom. Syst. II, 8, *In Am. insulis.*—Ib. Nom. Entom. emend. Ed. 1797, 78; Ed. 1810, 78, *Am.*—Goeze, Entom. Beytr. II, 8, *Der amerikanische Weissling.*—Herbst, Fuessly, Archiv d. Ins. 1786, 185, tab. xlix, fig. 8, *Amerika.*—Gmel. Linn. Syst. Nat. IV, 2042, *In America meridionali.*—Oliv. Encycl. méth. IV, 316, pl. cxxv, fig. 4, *Cayenne, Surinam, Antilles.*—? Browne, Nat. Hist. Jamaica, 431 (Cassida, 2) Index, iii, iv, tab. xliii, fig. 13, *Jamaica.*—Thunb. Mém. Acad. St. Petersb. X, 277, *Ex America meridionali et imprimis e Brasilia.*—Lherm. Ann. Soc. Entom. France, [1] VI, 506, *Guadeloupe.*—Westw. Drury, Ins.

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II, 70, pl. xxxvi, fig. 1, *New York, in Am. insulis.*—Emm. Agric. of N. Y. V, 141, pl. xlvi, fig. 7, *New York.*

oblongata Linn. Syst. Nat. 10th Ed. I, 435; 12th Ed. I, 689, *America.*—Goeze, Entom. Beytr. II, 63, *Die amerikanische längliche Schabe.*

occidentalis Fabr. Mant. Ins. I, 225, *America.*—Ib. Entom. Syst. II, 7, *In Am. insulis.*—Ib. Nom. Entom. emend. Ed. 1797, 78; Ed. 1810, 78, *Am.*—Gmel. Linn. Syst. Nat. 13, Ed. IV, 2041, *America.*—Oliv. Encycl. méth. IV, 314, *Amérique.*—Turt. Syst. Nat. Linn. II, 527, *American islands.*

orientalis Linn. Syst. Nat. 10th Ed. I, 434, *America, Oriente.*—Ib. Syst. Nat. 12th Ed. II, 688, *America; hospitatur in Oriente; hodie in Russiæ adjacentibus regionibus frequens; incepit nuperis temporibus Holmiæ* 1739 *uti dudum in Finlandia.*—Ib. Syst. Nat. 13th Ed. I, 688, *America, hospitatur in Oriente.*—Sulz. Kennz. der Ins. 78, Erkl. 16, tab. vii, fig. 47, *Amerika, Turkei; in den Gegenden Russlands, unlängst sind diese ungebettene Gäste auf ihrer Reise nach Westen, nach Finnland, Schweden, Deutschland und Schwaben gekommen.*— Müll. Linn. Natursyst. V, 404, *Eigentlich nur aus America herstammen durch die Handlung und Schiffahrt aber nach Asien gekommen.*—Fabr. Syst. Entom. 272; —Ib. Spec. Ins. I, 343, *America; hospitatur nunc in oriente adjacenteque Europa.*—Ib. Entom. Syst. II, 9, *America; hospitatur nunc in tota fere Europa.*— Gmel. Linn. Syst. Nat. 13th Ed. VI, 2043, *America; hospitatur in Oriente et Europa, a* 200 *inde annis in Bohemia, a* 1739 *in Belgio et antea in Finlandia et Russia.*—Vill. Linn. Entom. Faun. Suec. I, 429, *America; hospitatur in Oriente; hodie in Russiae adjacentibus regionibus frequens; incepit nuperis temporibus Holmiae* 1739 *uti dudum in Finlandia.*—Rœmer, Gen. Ins. 12, tab. viii, fig. 2, *America, hospitatur in Oriente.*—Turt. Syst. Nat. Linn. II, 529, *America; long since naturalized in Europe.* —Pal. de Beauv. Insectes, 228, pl. ii[e], fig. 3, *Le monde entier.*—Latr. Gen. Crust. et Ins. III, 83, *Europa, Am. bor.*—Ib. Cuv. Règne Anim. Ed. 1817, III, 371; Ed. 1829, V, 175; Ed. Disc. Ins. II, 9, pl. lxxvii, figs. 5, 6, *Russie et la Finland; originaire de l'Asie; quelques auteurs la font venir de l'Amérique méridionale.*—Leach, New Edinb. Encycl. IX, 120; Am. Ed. VIII, 709, *North America, common in Europe.*—Lam. Hist. nat. Anim. sans Vert. IV, 263; 2[e] Ed. IV, 463; 3[e] Ed. II, 159, *Le Levant, toute l'Europe, et l'Amérique septentrionale.*— Aud. et Brullé, Hist. nat. Ins. IX, 54, *Il n'est pas de partie du monde où il n'ait été transporté.* —Harr. Hitchc. Rep. 582; 2d Ed. 576;—Ib. Catal. 56, *Mass.* —Ib. Treat. Ed. 1841–2, 118; Ed. 1852, 128; Ed. 1862, 145, fig. 66, *Maritime towns of the United States.*—Oken, Allg. Naturg. V, C, 1505, *Aus dem Orient; in nordlichen America,*

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in ganz Europa.—LHERM. Ann. Soc. Entom. France, [1] VI, 506, *Guadeloupe.*—[Kakkerlac] BLANCH. Hist. nat. Ins. III, 6, *Univers.*—JAEG. N. Amer. Ins. 1854, 165; 1859, 117, *N. America.*—WALSH. Proc. Entom. Soc. Philad. III, 212, *S. Illinois.*

otomia SAUSS. Orthopt. Amér. moy. 104, *Mexique.*

papillosa THUNB. Mém. Acad. St. Petersb. X, 276, tab. xiv, *Ex America meridionali et imprimis e Brasilia.*

parallela HARR. Hitchc. Rep. 2d Ed. 576;—Catal. 56, *Mass.*

pellucens THUNB. Mém. Acad. St. Petersb. X, 276, tab. xiv, *Ex America meridionali, et imprimis e Brasilia.*

pellucida SAUSS. Blatt. nov. spec. 7;—IB. Rev. et Mag. de Zool, 311;—[Ectobia] IB. Orthopt. Amér. moy. 112, *Mexique.*—DALLAS, Zool. Record, I, 571, *Mexico.*—GERST. Archiv f. Nat. XXX, II, 430;—IB. Bericht, 1863–4, 124, *Mexiko.*

pennsylvanica DE GEER, Mém. III, 537, pl. xliv, fig. 4, *Pensylvanie.*—GOEZE, Entom. Beytr. II, 15, *Die braune pensylvanische Schabe.*—IB. De Geer, Gesch. Ins. III, 348, tab. xliv, fig. 4, *Pennsylvanien.*—GMEL. Linn. Syst. Nat. 13th Ed. IV, 2046, *Pennsylvania.*—OLIV. Encycl. méth. IV, 317, *Pennsylvanie.*—TURT. Syst. Nat. Linn. II, 531, *Pennsylvania.*—HARR. Hitchc. Rep. 2d Ed. 576;—IB. Catal. 56, *Mass.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 440, *Illinois.*

Petiveriana DUNC. Introd. Entom. 226, pl. vii, fig. 2, *West Indies.*

Poeyi SAUSS. Orthopt. nov. amer. III, 2;—IB. Rev. et Mag. de Zool. 1862, 164;—[Holclampra] Orthopt. Amér. moy. 94, *Cuba.*—GERST. Archiv f. Nat. XXIX, II, 354;—IB. Bericht, 1862, 40, *Cuba.*

porcellana SAUSS. Orthopt. nov. amer. III, 3;—IB. Rev. et Mag. de Zool. 1862, 164, *Cuba.*—GERST. Archiv f. Nat. XXIX, II, 354;—IB. Bericht, 1862, 40, *Cuba.*

punctulata PAL. DE BEAUV. Insectes, 183, pl. i^{b}, fig. 8, *Saint Domingue.*

pygmaea PAL. DE BEAUV. Insectes, 183, pl. i^{b}, fig. 9, *Saint Domingue.*—SAUSS. Orthopt. Amér. moy. 118, *St. Domingo.*

reflexa THUNB. Mém. Acad. St. Petersb. X, 278, *Ex America meridionali et imprimis e Brasilia.*

rufescens PAL. DE BEAUV. Insectes, pl. i^{b}, fig. 7, *Saint Domingue.*

ruficollis FABR. Nom. Entom. emend. Ed. 1797, 78; Ed. 1810, 78, *Ind.*

Servillei LEF. Serv. Orthopt. 91, *Rio Grande.*

sexnotata THUNB. Mém. Acad. St. Petersb. X, 276, tab. xiv, *Ex America meridionali et imprimis e Brasilia.*

Sulzerii [Blabera] GUÉR. Sagra, Hist. nat. de Cuba, 334, *Cuba.*

surinámensis LHERM. Ann. Soc. Entom. France, [1] VI, 506, *Guade-*

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loupe.—[Panchlora] Guér. Sagra, Hist. nat. de Cuba, 342, *Cuba*.

tarasca Sauss. Orthopt. nov. amer. III, 3;—Ib. Rev. et Mag. de Zool. 1862, 164;—Ib. Orthopt. Amér. moy. 95, *Mexique*.—Gerst. Archiv f. Nat. XXIX, II, 354;—Ib. Bericht, 1862, 40, *Mexiko*.

Thunbergii [Monachoda] Guér. Sagra, Hist. nat. de Cuba, 337, pl. xii, fig. 6, *Cuba*.

totonaca Sauss. Orthopt. nov. amer. III, 4;—Ib. Rev. et Mag. de Zool. 1862, 165, *Mexico calida*.—Ib. Orthopt. Amér. moy. 101, *Mexique (côte du golfe, province de Véra Cruz)*.—Gerst. Archiv f. Nat. XXIX, II, 354;—Ib. Bericht, 1862, 40, *Aus den heissen Theilen Mexiko's*.

translucida Sauss. Blatt. nov. spec. 7;—Ib. Rev. et Mag. de Zool. 311; —[Ectobia] Ib. Orthopt. Amér. moy. 113, *Mexique*.—Dallas, Zool. Record, I, 571, *Mexico*.—Gerst. Archiv f. Nat. XXX, II, 430;—Ib. Bericht, 1863–4, 124, *Mexiko*.

tuberculata Aud. et Brullé, Hist. nat. Ins. IX, 52, *De l'Amérique et des Indes*.

venosa Sauss. Blatt. nov. spec. 6;—Ib. Rev. et Mag. de Zool. 1864, 310;—Ib. Orthopt. Amér. moy, 106, *Mexique*.—Dallas, Zool. Record, I, 571, *Mexico*.—Gerst. Archiv f. Nat. XXX, II, 430; —Ib. Bericht, 1863–4, 124, *Mexiko*.

virescens Thunb. Mém. Acad. St. Petersb. X, 278, *Ex America meridionali et imprimis e Brasilia*.—Serv. Orthopt. 101, *Cuba*. —[Panchlora] Guér. Sagra, Hist. nat. de Cuba, 344, *Cuba*.

viridis Fabr. Syst. Entom. 272;—Ib. Spec. Ins. I, 343, *America*.— Ib. Entom. Syst. II, 8, *In Am. insulis*.—Ib. Nom. Entom. emend. Ed. 1797, 78; Ed. 1810, 78, *Am*.—Goeze, Entom. Beytr. II, 15, *Die amerikanische grüne Schabe*.—Gmel. Linn. Syst. Nat. 13th Ed. IV, 2043, *America*.—Oliv. Encycl. méth. IV, 316, *L'Amérique méridionale, Cayenne*.—Turt. Syst. Nat. Linn. II, 529, *American Islands*.

zapoteca Sauss. Orthopt. nov. amer. III, 5;—Ib. Rev. et Mag. de Zool. 1862, 166, *Mexico calida*.—Ib. Orthopt. Amér. moy. 105, *Les terres chaudes du Mexique; l'isthme de Téhuantepec*.— Gerst. Archiv f. Nat. XXIX, II, 354;—Ib. Bericht, 1862, 40, *Aus den heissen Gegenden Mexiko's*.

Brachylabris.

maritima Dohrn, Entom. Zeit. Stett. XXV, 293, *Japan, China, Ostindien, Madagascar, Westafrika und den Südstaeten der nordamerikanischen Union*.

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Brachypeplus.

magnus GIRARD, Marcy, Expl. Red River, 1853, 260, pl. xv, figs. 1–4; 1854, 249, pl. xv, figs. 1–4, *Red River of Louisiana.*—GERST. Archiv f. Nat. XX, II, 246;—IB. Bericht, 1853, 58, *Louisiana.*

virescens CHARP. Orthopt. descr. tab. li, *Mexico.*—GIRARD, Marcy, Expl. Red River, 1853, 261; 1854, 250, *Red River of Louisiana.*—ERICHS. Archiv f. Nat. X, II, 299;—IB. Bericht, 1843, 51, *Mexiko.*

Bradyporus.

spinulosus SERV. Ann. Sc. nat. XXII, 165, *Des Indes.*

BULLA, see GRYLLUS.
CACERLACA, see PERIPLANETA.
CALAMOPTERA, see ACANTHODIS.

Caloptenus.

bivittatus UHLER, Say, Entom. of N. Amer. Ed. Leconte, II, 238, *Atlantic States, western part of the country, Baltimore.*—SCUDD. Can. Nat. VII, 287, *Lake Winnipeg.*—IB. Bost. Journ. Nat. Hist. VII, 465, *Mass. Maine, Conn. Maryland, Texas, S. Illinois, Nebraska, Minnesota, Lake Winnipeg.* See also *Acridium bivittatum.*

borealis BRUNN. Orthopt. Stud. 3;—IB. Verhandl. zool. bot. Gesellsch. Wien, 1861, 223, *Labrador.*

femoratus BURM. Handb. d. Entom. II, 638, *Karolina.*—BRUNN. Orthopt. Stud. 4;—IB. Verhandl. zool. bot. Gesellsch. Wien, 1861, 224, *Süd Carolina.*—GERST. Archiv f. Nat. XXVIII, II, 319;—IB. Bericht, 1861, 47, *Süd Carolina.* See also *Acridium femoratum.*

femur rubrum BURM. Handb. d. Entom. II, 638, *Pennsylvanien.*—SCUDD. Can. Nat. VII, 287, *Red River.*—IB. Bost. Journ. Nat. Hist. VII, 464, *Massachusetts, Maine, Connecticut, S. Illinois, Minnesota, Nebraska, Red River Settlements.*—PACK. Rep. Nat. Hist. Maine, 1861, 374, *Mount Katahdin.*—WALSH, Trans. Ill. St. Agric. Soc. V, 497, *New England, Rock Island.* See also *Acridium femur rubrum.*

punctulatus UHLER, Scudd. Bost. Journ. Nat. Hist. VII, 465, *Maine.*—GERST. Archiv f. Nat. XXIX, II, 358;—IB. Bericht, 1862, 44, *Maine.*

sanguinipes SERV. Ann. Sc. Nat. XXII, 284, *Amérique méridionale.* See also ACRIDIUM.

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Camptonotus.

Scudderi UHLER, Proc. Entom. Soc. Philad. II, 549, *Maryland, Delaware.*—DALLAS, Zool. Record, I, 573, *Baltimore.*

CARDIOPTERA, see MANTIS.

Ceratinoptera.

diaphana BRUNN. Blatt. 76, *Indes occidentales, St. Thomas.*
porcellana BRUNN. Blatt. 79, *Cuba.*

Ceuthophilus.

Agassizii SCUDD. Bost. Journ. Nat. Hist. VII, 439, *Gulf of Georgia, Washington Territory.*
brevipes SCUDD. Bost. Journ. Nat. Hist. VII, 434, *Grand Menan.*—GERST. Archiv f. Nat. XXIX, II, 357;—IB. Bericht, 1862, 43, *Grand Menan.*
californianus SCUDD. Bost. Journ. Nat. Hist. VII, 438, *San Francisco, California.*—GERST. Archiv f. Nat. XXIX, II, 357;—IB. Bericht, 1862, 43, *San Francisco.*
divergens SCUDD. Bost. Journ. Nat. Hist. VII, 436, *Nebraska.*—GERST. Archiv f. Nat. XXIX, II, 357;—IB. Bericht, 1862, 43, *Nebraska.*
gracilipes SCUDD. Bost. Journ. Nat. Hist, VII, 439, *Southern Illinois, New York, New Jersey.*
lapidicolus SCUDD. Bost. Journ. Nat. Hist. VII, 435, *Maryland, Penn. Georgia.*
latens SCUDD. Bost. Journ. Nat. Hist. VII, 437, *Illinois.*—GERST. Archiv f. Nat. XXIX, II, 357;—IB. Bericht, 1862, 43, *Illinois.*
maculatus SCUDD. Bost. Journ. Nat. Hist. VII, 434, *Mass. Vermont, Maine, Anticosti.*—PACK. How to collect, 56;—IB. Rep. Nat. Hist. Maine, 1862, 196, *Maine.*
niger SCUDD. Bost. Journ. Nat. Hist. VII, 437, *Illinois.*—GERST. Archiv f. Nat. XXIX, II, 357;—IB. Bericht, 1862, 43, *Illinois.*
scabripes SCUDD. Bost. Journ. Nat. Hist. VII, 436, *Alabama.*
stygius SCUDD. Bost. Journ. Nat. Hist. VII, 438, *Hickman's Cave, Hickman's Landing, Kentucky.*
Uhleri SCUDD. Bost. Journ. Nat. Hist. VII, 435, *Maryland.*—GERST. Archiv f. Nat. XXIX, II, 357;—IB. Bericht, 1862, 43, *Maryland.*

Chœradodis.

strumaria SERV. Ann. Sc. Nat. XXII, 51, *Amérique méridionale.*

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Chloealtis.

conspersa Scudd. Can. Nat. VII, 286, *Dog's Head on Lake Winnipeg.*—Ib. Bost. Journ. Nat. Hist. VII, 455, *Massachusetts, N. Hampshire, Lake Winnipeg.* — Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Nord Amerika.* See also *Locusta conspersa.*

curtipennis Pack. Rep. Nat. Hist. Maine, 1861, 376, *Chamberlain Farm, Me.* See also *Locusta curtipennis.*

punctulata Scudd. Bost. Journ. Nat. Hist. VII, 455, *Connecticut.*—Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Connecticut.*

viridis Scudd. Bost. Journ. Nat. Hist. VII, 455, *Connecticut.*—Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Connecticut.*

See also Locusta.

Chloriphyllum.

Sagrai Burm. Germ. Zeitsch. f. Entom. II, 56, *Cuba.*—Serv. Orthopt. 755, pl. viii, fig. 5, *Cuba.*—Erichs. Archiv f. Nat. VI, II, 264;—Ib. Bericht, 1839, 48, *Cuba.* See also *Acridium Sagrai.*

See also Acridium.

Chorisoneura.

mysteca Brunn. Blatt. 258, *Mexique.*

Conocephalus.

acuminatus Thunb. Mém. Acad. St. Petersb. V, 273, *In Indiis et Europa australi.*—Serv. Ann. Sc. Nat. XXII, 149, *Du midi de l'Europe et des Indes suivant Fabricius.*

cinereus Thunb. Mém. Acad. St. Petersb. V, 273, *Jamaica.*

crepitans Scudd. Bost. Journ. Nat. Hist. VII, 450, *Texas, Nebraska.*—Gerst. Archiv f. Nat. XXIX, II, 357;—Ib. Bericht, 1862, 43, *Texas.*

dissimilis Serv. Orthopt. 518, *Amérique septentrionale.*—Thomas, Trans. Ill. St. Agric. Soc. V, 446, *Illinois.* See also *Locusta dissimilis.*

ensiger Harr. Treat. Ed. 1841–2, 131; Ed. 1852, 142; Ed. 1862, 163, fig. 79, *Mass.*—Erichs. Archiv f. Nat. IX, II, 227;—Ib. Bericht, 1842, 83, *Mass.*—Fitch. Am. Journ. Agric. and Sc. VI, 146, *New York.*—Scudd. Bost. Journ. Nat. Hist. VII, 449, *Massachusetts, Cape Cod, Vermont, Connecticut, Illinois, Minne-*

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sota, Nebraska.—JAEG. N. Amer. Ins. 1854, 154; 1859, 109, *N. America.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 445, *Illinois.*—See also *Gryllus ensiger.*

guttatus SERV. Orthopt. 518, *Cuba.*—GUÉR. Sagra, Hist. nat. de Cuba, 355, *Cuba.* See also *Locusta guttata.*

mexicanus SAUSS. Orthopt. nov. amer. I, 2;—IB. Rev. et Mag. de Zool. 1859, 208, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexico.*

Nieti SAUSS. Orthopt. nov. amer. I, 2;—IB. Rev. et Mag. de Zool. 1859, 208, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexico.*

obtusus SCUDD. Bost. Journ. Nat. Hist. VII, 450, *Georgia.* See also *Locusta obtusa.*

occidentalis SAUSS. Orthopt. nov. amer. I, 2;—IB. Rev. et Mag. de Zool. 1859, 208, *Haiti.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Haiti.*

robustus SCUDD. Bost. Journ. Nat. Hist. VII, 449, *Cape Cod.*—GERST. Archiv f. Nat. XXIX, II, 357;—IB. Bericht, 1862, 43, *Cape Cod.*

Sallei SAUSS. Orthopt. nov. amer. I, 10;—IB. Rev. et Mag. de Zool. 1859, 207, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexico.*

tricornis THUNB. Mém. Acad. St. Petersb. V, 278, *In Insula Bartholemi.*

triops THUNB. Mém. Acad. St. Petersb. V, 272, *In Indiis, ins. Bartholemi, Morocco.*

uncinatus HARR. Treat. Ed. 1841–2, 132; Ed. 1862, 164, *N. Carolina.*—GERST. Archiv f. Nat. XXIX, II, 357;—IB. Bericht, 1862, 43, *Alabama.*—SCUDD. Bost. Journ. Nat. Hist. VII, 450, *Alabama.*

See also GRYLLUS and LOCUSTA.

Copiophora.

cornuta SERV. Orthopt. 514, pl. x, fig. 3, *Amérique.*

mexicana SAUSS. Orthopt. nov. amer. I, 10;—IB. Rev. et Mag. de Zool. 1859, 207, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexico.*

Corydia.

azteca [Holocompsa] SAUSS. Orthopt. nov. amer. III, 13;—IB. Rev. et Mag. de Zool. 1862, 230, *Mexico calida.*—[Holocompsa] GERST. Archiv f. Nat. XXIX, II, 354;—IB. Bericht, 1862, 40, *Aus dem heissen Mexiko.*

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collaris [Holocompsa] BURM. Handb. d. Entom. II, 492, *St. Thomas.*
cyanea [Holocompsa] BURM. Handb. d. Entom. II, 492, *St. Thomas.*

Creoxylus.

spinosus WESTW. Catal. Orthopt. 104, *In Indiis (Fabr. nec in Ind. orient.) Demerara.*

Cryptocercus.

punctulatus SCUDD. Bost. Journ. Nat. Hist. VII, 420, *Virginia, New York, Penn.*—GERST. Archiv f. Nat. XXIX, II, 355;—IB. Bericht, 1862, 41, *Virginien und Pennsylvanien.*

Cyphoderris.

monstrosa UHLER, Proc. Entom. Soc. Philad. II, 552, *Oregon.*—DALLAS, Zool. Record, I, 573, *Oregon Territory.*

Cyphocrana.

angulata SERV. Ann. Sc. Nat. XXII, 61, *Ile Saint Vincent et île de la Guadeloupe.*
reticulata WESTW. Catal. Orthopt. 108, *St. Domingo.*

Cyrtophyllus.

concavus SCUDD. Bost. Journ. Nat. Hist. VII, 444, *Mass. Conn. New York.*
perspicillatus BURM. Handb. d. Entom. II, 697, *Südkarolina.*—SCUDD. Bost. Journ. Nat. Hist. VII, 444, *Texas.* See also *Locusta perspicillata.*
See also LOCUSTA.

Dactylotum.

bicolor CHARP. Orthop. descr. tab. lii, *Mexico.*—ERICHS. Archiv f. Nat. X, II, 299;—IB. Bericht, 1843, 51, *Mexico.*

Daihinia.

brevipes GIRARD, Marcy, Expl. Red River, 1853, 257, pl. xv, figs 9–13; 1854, 246, pl. xv. figs. 9–13, *Red River of Louisiana.*—SCUDD. Bost. Journ. Nat. Hist. VII, 443, *Nebraska.* See also *Phalangopsis brevipes.*
mexicana SAUSS. Orthopt. nov. amer. I, 15;—IB. Rev. et Mag. de Zool. 1859, 212, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49.

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robusta GIRARD, Marcy, Expl. Red River, 1853, 257; 1854, 246, *N. Mexico.*

See also PHALANGOPSIS.

Dasyposoma.

punctulata BRUNN. Blatt. 389, *Virginie, New York, Pennsylvanie.*

Decticus.

dorsalis BURM. Handb. d. Entom. II, 713, *Süd-Karolina.*
pachymerus BURM. Handb. d. Entom. II, 712, *Süd-Karolina.*

Diapherodes.

angulata BURM. Handb. d. Entom. II, 574, *Westindien.* See also *Phasma angulatum.*
Christopheri WESTW. Catal. Orthopt. 84, pl. xxiii, fig. 4, *St. Christopher.*
gigas WESTW. Catal. Orthopt. 84, *Isles of Saint Vincent and Guadeloupe.* See also *Phasma gigas.*
spinipes GRAY, Synops. Phasm. 34, *In India occidentali (St. Domingo).*
venustula WESTW. Catal. Orthopt. 84, *Cuba.* See also *Phasma venustulum.*

See also PHASMA.

Diapheromera.

bivittata HARR. Treat. Ed. 1841–2, 119; Ed. 1852, 130; Ed. 1862, 146, *America.*
calcarata WESTW. Catal. Orthopt. 20, *Mexico.*
femorata ? HARR. Treat. Ed. 1841–2, 119; Ed. 1852, 130; Ed. 1862, 146, fig. 67, *America.*—SCUDD. Can. Nat. VII, 284, *Red River Settlements, British America.*—IB. Bost. Journ. Nat. Hist. VII, 423, *Mass. N. Hampshire, Illinois, Red River Settlements in British America, Nebraska.* — PACK. How to collect, 55;—IB. Rep. Nat. Hist. Maine, 1862, 195, *N. England.*
Sayii GRAY, Synops. Phasm. 18, *In America septentrionali.*—FISCH. W. Bull. Soc. Imp. Nat. Mosc. X, VI, 13, *Amérique septentrionale.* SERV. Orthopt. 247, *New York.*—WESTW. Catal. Orthopt. 20, *Amer. septentr.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 441, *Illinois.*
Velii WALSH, Proc. Entom. Soc. Philad. III, 410, *Platte River, Nebraska.*—DALLAS, Zool. Record, I, 572, *Illinois.*

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Dictyopherus.

guttatus [Romalea] BLANCH. Hist. Nat. Ins. III, 40, *Amérique méridionale.*

reticulatus THUNB. Mém. Acad. St. Petersb. V, 259, *In America occidentali.*

DIPLOPHYLLUS, see PHYLLOPTERA.

Ectobia.

flavocincta SCUDD. Bost. Journ. Nat. Hist. VII, 419, *Mass. Western States, Lake Superior.*—GERST. Archiv f. Nat. XXIX, II, 355; —IB. Bericht, 1862, 41, *Nord Amerika.*—BRUNN. Blatt. 57, *États occidentaux de l'Amérique du Nord, Lac Supérieur.*

germanica SCUDD. Bost. Journ. Nat. Hist. VII, 418, *Mass. Vermont, New York, Maryland.*—GERST. Archiv f. Nat. XXIX, II, 355;—IB. Bericht, 1862, 41, *Nord Amerika.*

lithophila SCUDD. Bost. Journ. Nat. Hist. VII, 418, *Mass.*—GERST. Archiv f. Nat. XXIX, II, 355;—IB. Bericht, 1862, 41, *Nord Amerika.*

See also BLATTA.

Empusa.

chlorophæa BLANCH. Hist. Nat. Ins. III, 2, pl. iii, fig. 1, *New York.*

fronticornis SERV. Orthopt. 144, *Elle est notée comme des Antilles, mais c'est sans doute par erreur; je ne pense pas qu'il y ait des Empuses en Amérique.*

gongylodes WESTW. Drury, Ins. I, 122, pl. l, fig. 2, *Madras (and Philadelphia, sed? Drury) Africa, Asia, E. India.*

hyalina CHARP. Orthopt. descr. tab. ii, *In America meridionalis.*

pectinicornis LAM. Hist. nat. Anim. sans Vert. IV, 251; 2e Ed. IV, 452; 3e Ed. II, 155, *Jamaique.*—SERV. Ann. Sc. Nat. XXII, 48, *Jamaique.*

pennicornis WESTW. Drury, Ins. I, 121, pl. l, fig. 1, *Jamaica.*

spinifrons [Idolomorpha] SAUSS. Orthopt. nov. amer. I, 2;—IB. Rev. et Mag. de Zool. 1859, 61, *Am. merid.*

ENEOPTERA, see GRYLLUS.

Epaphrodita.

musarum SERV. Ann. Sc. Nat. XXII, 52;—IB. Orthopt. 205, *Saint Domingue.* See also *Mantis musarum.*

See also MANTIS.

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Ephippigera.

tschivavensis HALD. Stansb. Expl. Utah, 371, pl. x, fig. 3, *Chihuahua*.—SCHAUM, Archiv f. Nat. XIX, II, 270;—IB. Bericht, 1852, 130, *Utah*.

See also GRYLLUS and LOCUSTA.

Epilampra.

brasiliensis BRUNN. Blatt. 169, *Brésil, dans toute l'Amérique du Sud du versant oriental des Andes, île de Cuba, St. Domingue*.

mexicana [Planes] SAUSS. Orthopt. nov. amer. III, 2; IB. Rev. et Mag. de Zool. 1862, 228, *Mexico*.—IB. Orthopt. Amér. moy. 30, pl. ii, fig. 26, *Terres chaudes du Mexique*.—BRUNN. Blatt. 188, *Mexique*.

Forcinella.

asteca DOHRN, Entom. Zeit. Stett. XXIII, 226, *Mexico?*—GERST. Archiv f. Nat. XXIX, II, 358;—IB. Bericht, 1862, 44, *Mexiko*.

Forficesila.

americana SERV. Orthopt. 22, *Saint Domingue, Cuba*.

gigantea SERV. Orthopt. 23, pl. i, fig. 2, *Europe, N. America*.

suturalis DOHRN, Entom. Zeit. Stett. XXIII, 226, *Cordova*.—GERST. Archiv f. Nat. XXIX, II, 358;—IB. Bericht, 1862, 44, *Mexiko*.

See also FORFICULA.

Forficula.

affinis [Forficesila] GUÉR. Sagra, Hist. nat. de Cuba, 330, pl. xii, fig. 2, *Cuba*.—[Forficesila] GERST. Archiv f. Nat. XXIV, II, 349;—IB. Bericht, 1857, 157, *Cuba*.

albipes FABR. Mant. Ins. I, 224;—IB. Entom. Syst. II, 3, *In Americæ meridionalis Insulis*.—IB. Nom. Entom. emend. Ed. 1797, 78; Ed. 1810, 78, *Am. m.*—GMEL. Linn. Syst. Nat. Ed. 18, IV, 2039, *In insulis Americæ meridionali oppositis*.

americana PAL. DE BEAUV. Insectes, 165, pl. xiv, fig. 1, *Saint Domingue*.

annulata FABR. Entom. Syst. II, 4, *In Americæ meridionalis Insulis*.—IB. Nom. Entom. emend. Ed. 1797, 78; Ed. 1810, 78, *Am. m.*

auricularia JAEG. N. Amer. Ins. 1854, 166; 1859, 118, *N. America*.

bimaculata PAL. DE BEAUV. Insectes, 165, pl. xiv, fig. 2, *Saint Domingue*.—SERV. Ann. Sc. Nat. XXII, 32;—IB. Orthopt. 39, *Saint Domingue*.

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bivittata Burm. Handb. d. Entom. II, 751, *St. Domingo, Portoriko, Columbia.*

californica Dohrn, Entom. Zeit. Stett. XXVI, 85, *California.*

distincta [Forficesila] Guér. Sagra, Hist. nat. de Cuba, 329, pl. xii, fig. 1, *Cuba.*—[Forficesila] Gerst. Archiv f. Nat. XXIV, II, 349;—Ib. Bericht, 1857, 157, *Cuba.*

elegans Burm. Handb. d. Entom. II, 753, *Insel St. Johanna in Westindien.*

elongata Fabr. Entom. Syst. II, 4, *In Americæ meridionalis Insulis.*—Ib. Nom. Entom. emend. Ed. 1797, 78; Ed. 1810, 78, *Am. in.*

erythrocephala Fabr. Entom. Syst. II, 4, *In Americæ meridionalis Insulis.*—Ib. Nom. Entom. emend. Ed. 1797, 78; Ed. 1810, 78, *Am. m.*

gagathina Burm. Handb. d. Entom. II, 753, *Portoriko.*

gigantea [Lapidura] Fisch. Orthopt. Eur. 52, 65, tab. vi, fig. 1^a-1^f, *In Europâ meridionali, in insula Madera, in Africâ septentrionali, in Asiâ occidentali. In collectione D. Latreille duo specimina ♂ ex Americâ sept. allata adservantur.*

lugubris Dohrn, Entom. Zeit. Stett. XXIII, 236, *Cordova*—Gerst. Archiv f. Nat. XXIX, II, 359;—Ib. Bericht, 1862, 45, *Mexiko.*

minor Burm. Handb. d. Entom. II, 754, *Europa, Nordamerika.*—Serv. Orthopt. 44, *Europe, Amérique septentrionale.*—Fisch. Orthopt. Eur. 52, 70, tab. vi, fig. 7^a-7^d, *In totâ Europâ, in insulâ Madera, in Americâ septentrionali?*

minuscula Latr. Humb. et Bonpl. Rec. d'Obs. zool. II, 119, pl. xl, figs. 8, 9, *L'Amérique équinoxiale.*

parallela Westw. Guér. Mag. de Zool. VII, Cl. ix, pl. clxxviii;—Ib. Introd. Class. Ins. I, 402, *Mexico.*—Germ. Germ. Zeitsch. f. Entom. I, 319, *Mexico.*

procera Burm. Handb. d. Entom. II, 753, *Westindische Inseln.*

pulchella Serv. Orthopt. 42, *Amérique septentrionale, Niagara.*

ruficeps Burm. Handb. d. Entom. II, 755, *Mexiko.*

scabriuscula Serv. Orthopt. 38, *Amérique méridionale.*

taeniata Dohrn, Entom. Zeit. Stett. XXIII, 230, *Oaxaca, Mirador, (Mexico).*—Gerst. Archiv f. Nat. XXIX, II, 359;—Ib. Bericht, 1862, 45, *Mexiko.*

unidentata Pal. de Beauv. Insectes, 165, pl. xiv, fig. 3, *Saint Domingue.*—Serv. Ann. Sc. Nat. XXII, 33;—Ib. Orthopt. 41, *Saint Domingue.*

Gnathoclita, see Locusta.

Gomphocerus.

clavicornis Thunb. Mém. Acad. St. Petersb. V, 221, *In Indiis.*

infuscatus Uhler, Harr. Treat. Ed. 1862, 181, *Mass.*

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pelidnus BURM. Handb. d. Entom. II, 650, *Pennsylvanien.*
radiatus UHLER, Harr. Treat. Ed. 1862, 181, *Mass.*
viridifasciatus UHLER, Harr. Treat. Ed. 1862, 181, *Mass.*

Gryllacris.

carolinensis GERST. Archiv f. Nat. XXVI, I, 276, *Carolina.*

Gryllotalpa.

americana HARR. Hitchc. Rep. 2d Ed. 576;—IB. Catal. 56, *Mass.*—LEIDY, Proc. Acad. Nat. Sc. Philad. V, 204, *Newark, Delaware.*

asteca SAUSS. Orthopt. nov. amer. I, 15;—IB. Rev. et Mag. de Zool. 1859, 316, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 404;—IB. Bericht, 1859–60, 48, *Mexico.*

borealis BURM. Handb. d. Entom. II, 740, *Nordamerika.*—UHLER, Harr. Treat. Ed. 1862, 149, *Mass.*—SCUDD. Bost. Journ. Nat. Hist. VII, 426, *Mass. Nantucket, Vermont.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 441, *Maryland.* See also *Gryllus borealis.*

brevipennis SERV. Orthopt. 368, *Amérique septentrionale, Caroline, Philadelphie, Louisiane.*—HARR. Treat. Ed. 1841–2, 120; Ed. 1852, 131; Ed. 1862, 149, fig. 68, *Mass.*—FITCH, Amer. Journ. Agric. and Sc. VI, 146, *New York.* See also *Gryllus brevipennis.*

cultriger UHLER, Proc. Entom. Soc. Philad. II, 543, *El Paso.*—DALLAS, Zool. Record, I, 573, *El Paso.*

didactyla JOHNST. Trans. Entom. Soc. Lond. II, xxiv, *Saint Vincent's.*—KIRBY and SPENCE, Introd. Entom. 7th Ed. 102, *St. Vincent.*—WESTW. Introd. Class. Ins. I, 447, *West Indies.*—HARR. Treat. Ed. 1841–2, 121; Ed. 1852, 132; Ed. 1862, 149, *West Indies.*—WESTW. Cuv. Anim. Kingd. 560, *West Indies.*

hexadactyla SERV. Orthopt. 307, *Brésil, Guadeloupe.*—GUÉR. Sagra, Hist. nat. de Cuba, 355, pl. xii, fig. 8, *Cuba, Brésil, Guadeloupe.*

longipennis SCUDD. Bost. Journ. Nat. Hist. VII, 426, *Mass. Maryland.*—GERST. Archiv f. Nat. XXIX, II, 356;—IB. Bericht, 1862, 42, *Massachusetts.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 441, *Arkansas.*

mexicana BURM. Handb. d. Entom. II, 740, *Alvarado in Mexiko.* See also *Gryllus mexicanus.*

See also GRYLLUS.

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Gryllus.

abbreviatus Serv. Orthopt. 336, *Amérique septentrionale.*—Burm. Germ. Zeitsch. f. Entom. II, 74, *Nord America.*—De Haan, Bijdr. Kenn. Orthopt. 225, *Noord-Amerika.*— Scudd. Bost. Journ. Nat. Hist. VII, 427, *Mass. Cape Cod, Maryland.*

acuminatus [Tettigonia] Linn. Syst. Nat. 10th Ed. I, 429, *In Indiis.* —Ib. Syst. Nat. 12th Ed. II, 696; 13th Ed. I, 696, *America.*—[Tettigonia] Ib. Mus. Lud. Ulr. Reg. 130, *In Indiis.*—[Tettigonia] Müll. Linn. Natursyst. V, 430, *America.*—[Tettigonia] Goeze, Entom. Beytr. II, 60, *Der amerikanische Spitzwirbel.*—[Tettigonia] Gmel. Linn. Syst. Nat. I, iv, 2065, *In America meridionali.*—[Tettigonia] Rœm. Gen. Ins. 13, tab. ix, fig. 1, *America.* —[Tettigonia] Stoll', Répr. de Spectres, Saut. à sabre, 18, 19, pl. viii*, figs. 27–9, *Pennsylvanie.*

ægyptus Thunb. Mém. Acad. St. Petersb. V, 247, *In insula Bartholemy.*

æqualis Say, Journ. Acad. Nat. Sc. Philad. IV, 307;—Ib. Entom. of N. Amer. Ed. Leconte, II, 237, *United States.*

agilis [Tettigonia] Goeze, Entom. Beytr. II, 99, *Der pensylvanische Läufer.*—[Tettigonia] Gmel. Linn. Syst. Nat. I, iv, 2071, *Pennsylvania.*—[Locusta] Turt. Syst. Nat. Linn. II, 555, *Pennsylvania.*—[Pterophyllus] Harr. Hitchc. Rep. 582; 2d Ed. 576; —Ib. Catal. 56, *Mass.*

americanus Drury, Illustr. Nat. Hist. I, 128, pl. xlix, fig. 2; II, app. *Virginia, Antigua, New York, Madras, Sierra Leon.*

angustus Scudd. Bost. Journ. Nat. Hist. VII, 427, *Mass. Cape Cod.* —Gerst. Archiv f. Nat. XXIX, ii, 356;—Ib. Bericht, 1862, 42, *Massachusetts.*

annulatus Herbst, Fuessly, Archiv d. Ins. 1786, 195, tab. liii, fig. 4, *Amerika.*—[Locusta] Gmel. Linn. Syst. Nat. I, iv, 2081, *America.*—Turt. Syst. Nat. Linn. II, 565, *America.*

annulipes [Phalangopsis] De Haan, Bijdr. Kenn. Orthopt. 226, *Port au Prince.*

aquilinus [Tettigonia] Linn. Syst. Nat. 10th Ed. I, 430; 12th Ed. II, 697; 13th Ed. I, 697;—[Tettigonia] Ib. Mus. Lud. Ulr. Reg. 133, *In Indiis.*—[Tettigonia] Müll. Linn. Natursyst. V, 431, *Indien.*—[Tettigonia] Goeze, Entom. Beytr. II, 61, *Der indianische Breitflügel.*

assimilis [Acheta] Goeze, Entom. Beytr. II, 87, *Die jamaische Hausgrille.*—[Acheta] Gmel. Linn. Syst. Nat. I, iv, 2060, *In insulis Americæ meridionalis oppositis.*—Oliv. Encycl. méth. VI, 634, *Jamaique.*—[Acheta] Turt. Syst. Nat. Linn. II, 544, *Jamaica.*—Burm. Handb. d. Entom. II, 733, *Mittel und Süd-Amerika* —De Haan, Bijdr. Kenn. Orthopt. 226, *Middel en Zuid-Amerika.*

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aztecus Sauss. Orthopt. nov. amer. I, 16;—Ib. Rev. et Mag. de Zool. 1859, 316, *Tellus mexicana.*—Gerst. Archiv f. Nat. XXVI, II, 404;—Ib. Bericht, 1859–60, 48.

bicornis [Mantis] Linn. Syst. Nat. 10th Ed. I, 426;—[Mantis] Ib. Mus. Lud. Ulr. Reg. 116, *In Indiis.*

bipunctatus De Geer, Mém. III, 523, pl. xliii, fig. 7, *Pensylvanie.*—[Acheta] Goeze, Entom. Beytr. II, 89, *Der pensylvanische Zweypunkt.*—Ib. De Geer, Gesch. Ins. III, 340, tab. xliii, fig. 7, *Pennsylvanien.*—Oliv. Encycl. méth. VI, 637, *Am. sept. Pennsylvanie.*—Burm. Handb. d. Entom. II, 732, *Pennsylvanien.*—[Œcanthus] De Haan, Bijdr. Kenn. Orthopt. 225, *Noord-Amerika.*

bivittatus Say, Journ. Acad. Nat. Sc. Philad. IV, 308;—Ib. Entom. of N. Amer. Ed. Leconte, II, 237, *Arkansas.*

borealis [Gryllotalpa] De Haan, Bijdr. Kenn. Orthopt. 225, *Noord-Amerika.*

brevicornis [Acridium] Linn. Cent. Ins. rar. 15;—[Acridium] Ib. Amœn. Acad. VI, 398;—[Acrida] Ib. Syst. Nat. 12th Ed. II, 692; 13th Ed. I, 692, *In America septentrionali.*—[Acrida] Müll. Linn. Natursyst. V, 419, *In dem mitternachtlichen America.*—[Acrida] Goeze, Entom. Beytr. II, 45, *Das amerikanische Kurzhorn.*—[Acrida sive Truxalis] Gmel. Linn. Syst. Nat. I, IV, 2056, *In America meridionali.*—[Truxalis] Turt. Syst. Nat. Linn. II, 542, *America.*

brevipennis [Gryllotalpa] De Haan, Bijdr. Kenn. Orthopt. 225, *Noord-Amerika.*

cærulescens [Locusta] Linn. Syst. Nat. 10th Ed. I, 432; 12th Ed. II, 700; 13th Ed. I, 700, *In meridionalibus.*

camellifolius [Tettigonia] Goeze, Entom. Beytr. II, 92, *Das amerikanische Kamillenblatt.*—[Tettigonia] Gmel. Linn. Syst. Nat. I, IV, 2064, *America.*—[Locusta] Turt. Syst. Nat. Linn. II, 548, *America.*

campestris ? Kalm, Travels, II, 10;—Ib. Pink. Voy. XIII, 506, *New York, Canada.*—Ib. Travels, II, 69;—Ib. Pink. Voy. XIII, 524, *All parts of N. America where I have been.*—Ib. Travels, II, 126;—Ib. Pink. Voy. XIII, 542, *New Jersey.*

carinatus [Bulla] Linn. Syst. Nat. 10th Ed. I, 427; 12th Ed. II, 693; 13th Ed. I, 693, *In Indiis.*—[Bulla] Müll. Linn. Natursyst. V, 421, *Aus Indien.*—[Bulla] Gorze, Entom. Beytr. II, 46, *Der indianische Glattschild.*—[Locusta] Stoll', Répr. d. Spectres, Saut. de passage, 12, pl. v^{b}, fig. 16, *L'Amérique.*

carolinus [Locusta] Linn. Syst. Nat. 10th Ed. I, 433; 12th Ed. II, 701; 13th. Ed. I, 701, *America.*—[Mantis] Ib. Cent. Ins. rar. 13;—[Mantis] Ib. Amœn. Acad. VI, 396, *Carolina.*—[Locusta] Müll. Linn. Natursyst. V, 443, *Carolina.*—Fabr. Syst. Entom. 291, *America.*—Ib. Spec. Ins. I, 368, *In America boreali.*—Ib.

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Entom. Syst. II, 58, *America*.—[Locusta] GOEZE, Entom. Beytr. II, 76, *Der karolinische Gelbrand*.—[Locusta] GMEL. Linn. Syst. Nat. I, IV, 2078, *In America boreali*.—TURT. Syst. Nat. Linn. II, 562, *America*.—FITCH, Amer. Journ. Agric. and Sc. VI, 146, *New York*.—JAEG. N. Amer. Ins. 1854, 140, pl. v, fig. 22; 1859, 97, fig. 22, *United States*.

centurio [Locusta] DRURY, Illustr. Nat. Hist. II, 78, pl. xli, fig. 3, *Bay of Honduras*.—[Locusta] GOEZE, Entom. Beytr. II, 101, *Der amerikanische Hauptmann*.—[Locusta] STOLL', Répr. d. Spectres, Saut. de passage, 15, pl. vi^{b}, fig. 19, *Nouvelle Georgie*.

chrysomelas [Locusta] GMEL. Linn. Syst. Nat. I, IV, 2086, *Pennsylvania*.—TURT. Linn. Syst. Nat. II, 569, *Pennsylvania*.

citrifolius [Tettigonia] LINN. Syst. Nat. 10th Ed. I, 429; 12th Ed. II, 695; 13th Ed. I, 695;—[Tettigonia] IB. Mus. Lud. Ulr. Reg. 125, *In Indiis*.—[Tettigonia] MÜLL. Linn. Natursyst. V, 427, *Aus den Indien*.—[Tettigonia] GOEZE, Entom. Beytr. II, 58, *Das indianische Zitronblatt*.

columbinus THUNB. Mém. Acad. St. Petersb. IX, 399, 425, *In Bartholemi, ins. Americes*.

concavus [Pterophylla] HARR. Hitch. Rep. 582; 2d. Ed. 576;—IB. Catal. 56, *Mass*.

corallinus FITCH, Amer. Journ. Agric. and Sc. VI, 146, *New York*.

coriaceus [Tettigonia] LINN. Syst. Nat. 10th Ed. I, 430; 12th Ed. II, 697; 13th Ed. I, 697.—[Tettigonia] IB. Mus. Lud. Ulr. Reg. 136, *In Indiis*.—[Tettigonia] MÜLL. Linn. Natursyst. V, 43, *Indien*.

coronatus [Tettigonia] LINN. Syst. Nat. 10th Ed. I, 430; 12th Ed. II, 697; 13th Ed. I, 697, *In Indiis*.—[Tettigonia] MÜLL. Linn. Natursyst. V, 430, *In Indien*.—[Tettigonia] GOEZE, Entom. Beytr. II, 61, *Die indianische Heuschrekke*.

cristatus [Locusta] LINN. Syst. Nat. 10th Ed. I, 431; 12th Ed. II, 699; 13th Ed. I, 699, *America, Arabia, Asia*.—[Locusta] IB. Mus. Lud. Ulr. Reg. 137, *Asia, Africa, America*.—[Locusta] STOLL', Répr. d. Spectres, Saut. de passage, 21, pl. ix^{b}, fig. 30, *Arabie et L'Amérique*.

crucis [Acheta] GMEL. Linn. Syst. Nat. I, IV, 2062, *In insula S. Crucis*.—OLIV. Encycl. méth. VI, 637, *Sainte Croix*.—[Acheta] TURT. Syst. Nat. Linn. II, 545, *Santa Cruz*.

cubensis SAUSS. Orthopt. nov. amer. I, 15;—IB. Rev. et Mag. de Zool. 1859, 316, *Cuba*.—GERST. Archiv f. Nat. XXVI, II, 404;—IB. Bericht, 1859–60, 48.

curvicaudus [Tettigonia] GOEZE, Entom. Beytr. II, 98, *Der pensylvanische Krummschwanz*.—[Tettigonia] GMEL. Linn. Syst. Nat. I, IV, 2071, *In Pennsylvaniæ pratis*.—[Locusta] TURT. Syst. Nat. Linn. II, 555, *Pennsylvania*.—[Pterophyllus] HARR. Hitchc. Rep. 582; 2d Ed. 576;—IB. Catal. 56, *Mass*.

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cyaneus TURT. Syst. Nat. Linn. II, 563, *America.*

cyanipes FABR. Syst. Entom. 292, *America.*—IB. Spec. Ins. I, 370, *In Americæ meridionalis insulis.*—IB. Entom. Syst. II, 60, *America.*—IB. Nom. Entom. emend. Ed. 1797, 82; Ed. 1810, 82, *Am.*—[Locusta] GOEZE, Entom. Beytr. II, 106, *Der amerikanische Blaufuss.*—[Locusta] GMEL. Linn. Syst. Nat. I, IV, 2080, *In insulis Americæ meridionali oppositis.*

dentatus [Locusta] GOEZE, Entom. Beytr. II, 114, *Die indianische Heuschrekke.*

dux [Locusta] DRURY, Illustr. Nat. Hist. II, 82, pl. xliv, *Bay of Honduras.*—[Locusta] GOEZE, Entom. Beytr. II, 102, *Der amerikanische Fürst.*—FABR. Spec. Ins. I, 362;—IB. Entom. Syst. II, 47, *America meridionalis.*—IB. Nom. Entom. emend. Ed. 1797, 81; Ed. 1810, 81, *Am. m.*—[Locusta] GMEL. Linn. Syst. Nat. I, IV, 2074, *In America meridionali.*

elongatus [Tettigonia] LINN. Mus. Lud. Ulr. Reg. 127, *In Indiis.*—[Tettigonia] MÜLL. Linn. Natursyst. V, 429, *Indien.*—[Tettigonia] GOEZE, Entom. Beytr. II, 59, *Der indianische Langflügel.*

ensiger [Conocephalus] HARR. Hitchc. Rep. 2d Ed. 576;—IB. Catal. 56, *Mass.*

erythropus [Locusta] GMEL. Linn. Syst. Nat. I, IV, 2086, *Pennsylvania.*—TURT. Syst. Nat. Linn. II, 568, *Pennsylvania.*

fasciatus DE GEER, Mém. III, 522, pl. xliii, fig. 5, *Pensylvanie.*—[Acheta] GOEZE, Entom. Beytr. II, 89, *Die pensylvanische Grille.*—[Tettigonia] IB. Entom. Beytr. II, 99, *Die pensylvanische Säbelheuschrekke.*—IB. De Geer, Gesch. Ins. III, 339, tab. xliii, fig. 5, *Pennsylvanien.*—[Acheta] GMEL. Linn. Syst. Nat. I, IV, 2063;—[Tettigonia] IB. Linn. Syst. Nat. IV, 2072, *Pennsylvania.*—[Acheta] TURT. Syst. Nat. Linn. II, 547;—[Locusta] IB. Syst. Nat. Linn. II, 555, *Pennsylvania.*—[Pterophyllus] HARR. Hitchc. Rep. 582; 2d Ed. 576;—IB. Catal. 56, *Mass.*—DE HAAN, Bijdr. Kenn. Orthopt. 225, *Noord-Amerika.*

fastigiatus [Tettigonia] LINN. Syst. Nat. 10th Ed. I, 430; 12th Ed. II, 697; 13th Ed. I, 697;—[Tettigonia] IB. Mus. Lud. Ulr. Reg. 135, *In Indiis.*—[Tettigonia] GOEZE, Entom. Beytr. II, 62, *Der indianische Langstachel.*

femur rubrum [Locusta] GOEZE, Entom. Beytr. II, 115, *Die pensylvanische Rothhüfte.*

flavicornis THUNB. Mém. Acad. St. Petersb. IX, 406, *China, Indiis et Prom. bon. spei.*

flavipes [Acheta] TURT. Syst. Nat. Linn. II, 545, *St. Thomas Island.*

flavus FABR. Entom. Syst. II, 59, *America.*—IB. Nom. Entom. emend. Ed. 1797, 82; Ed. 1810, 82, *Am.*—TURT. Syst. Nat. Linn. II, 563, *America.*—THUNB. Mém. Acad. St. Petersb. V, 232; IX,

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395, 410, *In America et in capite bonæ spei vulgaris.*—Ib. Hem. max. cap. 2, *In cap. bonæ spei et in America.*

formosus Say, Amer. Entom. III, pl. xxxiv;—Ib. Entom. of N. Amer. Ed. Leconte, I, 78, pl. xxxiv, *Arkansas River.*

fuliginosus [Acheta] Stoll', Répr. d. Spectres, Grillons, 5, pl. iii*, fig. 10, *L'Amérique.*

fuscus Thunb. Mém. Acad. St. Petersb. V, 235; IX, 421, *Nova Cambria.*

giganteus [Acrida sive Truxalis] Gmel. Linn. Syst. Nat. I, iv, 2057, *America.*—[Truxalis] Turt. Syst. Nat. Linn. II, 542, *America.*

gigas [Mantis] Linn. Mus. Lud. Ulr. Reg. 109, *In India orientali et occidentali.*—[Acheta] Goeze, Entom. Beytr. II, 86, *Die amerikanische Riesengrille.*—[Acheta] Gmel. Linn. Syst. Nat. I, iv, 2062.—Turt. Syst. Nat. Linn. II, 546, *America.*—[Acheta] Rœm. Gen. Ins. 13, tab. viii, fig. 8, *America.*

gongylodes [Mantis] Linn. Syst. Nat. 10th Ed. I, 426, *In Indiis.*—Sulz. Kennz. der Ins. Erkl. 20, tab. viii, fig. 56, *Indien.*

gryllodes Pallas, Spic. zool. I, 16, tab. i, fig. 10, *Jamaica.*—[Acheta] Gmel. Linn. Syst. Nat. I, iv, 2062.—Turt. Syst. Nat. Linn. II, 546, *Jamaica.*—Oliv. Encycl. méth. VI, 637, *Jamaique.*—[Encoptera] De Haan, Bijdr. Kenn. Orthopt. 226, 232, *Jamaica? Java, Celebes.*

gryllotalpa [Acheta] Linn. Syst. Nat. 10th Ed. I, 428, *In Europæ et Americæ borealis herbosis et cultis.*—[Acheta] Ib. Syst. Nat. 12th Ed. II, 693; 13th Ed. I, 693, *In Europæ et Americæ borealis herbosis et cultis; in Java.*—[Acheta] Ib. Mus. Lud. Ulr. Reg. 123, *Europa, America, Asia.*—[Acheta] Gmel. Linn. Syst. Nat. I, iv, 2059, *In Europæ, borealis Americæ et Asiæ, ipsius Javæ cultis.*—[Acheta] Vill. Linn. Entom. Faun. Suec. I, 436, *In Europæ et Americæ borealis herbosis et cultis.*—[Acheta] Turt. Syst. Nat. Linn. II, 544, *Europe and America.*—Oken, Allg. Naturg. V, C, 1528, *In ganz Europa, in Schweden nur bis Schonen; in Nordamerica.*

guadeloupensis [Acheta] Turt. Syst. Nat. Linn. II, 546, *Guadeloupe.*

hæmatopus [Locusta] Linn. Syst. Nat. 10th Ed. I, 432; 12th Ed. II, 700; 13th Ed. I, 700;—[Locusta] Ib. Mus. Lud. Ulr. Reg. 143, *In Indiis.*—[Locusta] Müll. Linn. Natursyst. V, 439, *Indien.*—Fabr. Syst. Entom. 289;—Ib. Spec. Ins. I, 365;—Ib. Entom. Syst. II, 52, *In Indiis.*—Ib. Nom. Entom. emend. Ed. 1797, 81; Ed. 1810, 81, *Ind.*—[Locusta] Goeze, Entom. Beytr. II, 69, *Der indianische Blutschenkel.*

hirtipes Say, Amer. Entom. III, pl. xxxiv;—Ib. Entom. of N. Amer. Ed. Leconte, I, 78, pl. xxxiv, *Arkansas River.*

hospes [Acheta] Goeze, Entom. Beytr. II, 87, *Der amerikanische Gast.*—[Acheta] Gmel. Linn. Syst. Nat. I, iv, 2061, *America.*

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—Oliv. Encycl. méth. VI, 636, *Am. sept. en Pennsylvanie.*—[Acheta] Turt. Syst. Nat. Linn. II, 545, *America.*

irroratus [Mantis] Linn. Cent. Ins. rar. 14;—[Mantis] Ib. Amœn. Acad. VI, 397, *Carolina.*

lamellatus [Tettigonia] Linn. Syst. Nat. 10th Ed. I, 429, *In Indiis.*

lamellosus [Tettigonia] Linn. Mus. Lud. Ulr. Reg. 128;—[Tettigonia] Ib. Syst. Nat. 12th Ed. II, 696; 13th Ed. I, 696, *In Indiis.*—[Tettigonia] Goeze, Entom. Beytr. II, 60, *Das indianische Schenkelblatt.*—[Locusta] Turt. Syst. Nat. Linn. II, 550, *America.*

lateralis Fabr. Syst. Entom. 293, *America.*—Ib. Spec. Ins. I, 370, *In Americæ meridionalis insulis.*—Ib. Entom. Syst. II, 60, *America.*—Ib. Nom. Entom. emend. Ed. 1797, 82; Ed. 1810, 82, *Am.*—[Locusta] Goeze, Entom. Beytr. II, 107, *Der amerikanische Seitenpunkt.*—[Locusta] Gmel. Linn. Syst. Nat. I, iv, 2080, *In insulis Americæ meridionali oppositis.*—Turt. Syst. Nat. Linn. II, 563, *America.*

laurifolius Linn. Mus. Adolph. Fred. 83, *(Fol. lauri) America.*—[Tettigonia] Ib. Syst. Nat. 10th Ed. I, 429, *In Indiis.*—[Tettigonia] Ib. Syst. Nat. 12th Ed. II, 695; 13th Ed. I, 695, *In Indiis, Carolina.*—[Tettigonia] Ib. Mus. Lud. Ulr. Reg. 126, *In America meridionali.*—[Tettigonia] Müll. Linn. Natursyst. V, 428, *Carolina, Brasilia, Jamaica.*—[Tettigonia] Goeze, Entom. Beytr. II, 59, *Das karolinische Lorberblatt.*—[Tettigonia] Gmel. Linn. Syst. Nat. I, iv, 2063, *America, Nova Hollandia.*—Shaw and Nodder, Nat. Misc. IV, pl. cxv, *America.*—[Locusta] Turt. Syst. Nat. Linn. II, 547, *America.*

lineaticeps Stål, Orthopt. Eug. Resa, 314, *California ad San Francisco.*—Gerst. Archiv f. Nat. XXVIII, ii, 313;—Ib. Bericht, 1861, 41, *California.*

luctuosus Burm. Germ. Zeitsch. f. Entom. II, 74, *Süd Karolina.*—Serv. Orthopt. 335, *Amérique septentrionale.*—De Haan, Bijdr. Kenn. Orthopt. 225, *Californie, Noord-Amerika.*—Scudd. Bost. Journ. Nat. Hist. VII, 427, *Mass. Cape Cod, N. Hampshire.*

lunus Fabr. Syst. Entom. 288;—Ib. Spec. Ins. I, 364;—Ib. Entom. Syst. II, 47, *In America meridionali.*

maculatus [Ephippiger] Harr. Hitch. Rep. 2d Ed. 576;—Ib. Catal. 56, *Mass.*

maxillosus [Tettigonia] Goeze, Entom. Beytr. II, 93, *Die amerikanische Kinnlade.*—[Tettigonia] Gmel. Linn. Syst. Nat. I, iv, 2064, *In insulis Americæ oppositis.*—[Locusta] Turt. Syst. Nat. Linn. II, 549, *America.*

melanopterus [Tettigonia] Linn. Syst. Nat. 10th Ed. I, 430; 12th Ed. II, 697; 13th Ed. I, 697;—[Tettigonia] Ib. Mus. Lud. Ulr. Reg. 134, *In Indiis.*—[Tettigonia] Müll. Linn. Natursyst. V,

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431, *Indien.*—[Tettigonia] GOEZE, Entom. Beytr. II, 62, *Der indianische Schwarzflügel.*

membranaceus [Acheta] DRURY, Illustr. Nat. Hist. II, 81, pl. xlii, fig. 2, *Bay of Honduras and Muskito Shore.*

mexicanus [Gryllotalpa] DE HAAN, Bijdr. Kenn. Orthopt. 226, *Mexico.*—SAUSS. Orthopt. nov. amer. I, 15;—IB. Rev. et Mag. de Zool. 1859, 316, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 404;—IB. Bericht, 1859–60, 48.

miles [Locusta] DRURY, Illustr. Nat. Hist. II, 79, pl. xlii, fig. 2, *Bay of Honduras.*—[Locusta] GOEZE, Entom. Beytr. II, 102, *Der amerikanische Soldat.*—[Locusta] GMEL. Linn. Syst. Nat. I, IV, 2082, *America.*

miliaris [Locusta] LINN. Syst. Nat. 10th Ed. I, 432; 12th Ed. II, 700; 13th Ed. I, 700, *America.*—[Locusta] IB. Mus. Lud. Ulr. Reg. 142, *In Indiis.*—[Locusta] MÜLL, Linn. Natursyst. V, 439, *America.*—FABR. Syst. Entom. 288, *America.*—IB. Spec. Ins. I, 364, *In America meridionali.*—IB. Entom. Syst. II, 50, *America.*—IB. Nom. Entom. emend. Ed. 1797, 81; Ed. 1810, 81, *Am.*—[Locusta] GOEZE, Entom. Beytr. II, 69, *Der amerikanische Frieselflügel.*—[Locusta] GMEL. Linn. Syst. Nat. I, IV, 2075, *In America meridionali.*—TURT. Syst. Nat. Linn. II, 558, *America.*

minutus [Acheta] LINN. Syst. Nat. 12th Ed. II, 694; 13th Ed. I, 694, *America.*—[Acheta] MÜLL. Linn. Natursyst. V, 424, *America.*—[Acheta] GOEZE, Entom. Beytr. II, 53, *Die jamaikanische Grille.*—[Acheta] GMEL. Linn. Syst. Nat. I, IV, 2060, *In America meridionali.*—[Acheta] TURT. Syst. Nat. Linn. II, 546, *America.*

monstrosus [Acheta] GOEZE, Entom. Beytr. II, 86, *Der indianische Drachenschwanz.*—OLIV. Encycl. méth. VI, 633, pl. cxxviii, fig. 15, *Am. mérid.*

morbillosus [Locusta] LINN. Syst. Nat. 10th Ed. I, 431, *In Indiis.*

myrtifolius [Locusta] DRURY, Illustr. Nat. Hist. II, 78, pl. xli, fig. 2, *New York.*—[Tettigonia] GMEL. Linn. Syst. Nat. I, IV, 2064, *In America meridionali.*—[Phyllopterus] WESTW. Drury, Ins. II, 88, pl. xli, fig. 2, *N. York, America.*

neglectus SCUDD. Bost. Journ. Nat. Hist. VII, 428, *Mass. Cape Cod.*—PACK. How to collect, 55;—IB. Rep. Nat. Hist. Maine, 1862, 195, *Maine.*—GERST. Archiv f. Nat. XXIX, II, 356;—IB. Bericht, 1862, 42, *Massachusetts.*

niger SCUDD. Bost. Journ. Nat. Hist. VII, 428, *Mass.*—GERST. Archiv f. Nat. XXIX, II, 356;—IB. Bericht, 1862, 42, *Massachusetts.*

niveus DE GEER, Mém. III, 522, pl. xliii, fig. 6, *Pensylvanie.*—[Acheta] GOEZE, Entom. Beytr. II, 89, *Die pensylvanische Grille.*—IB. De Geer, Gesch. Ins. III, 339, tab. xliii, fig. 6, *Pennsylvanien.*—[Acheta] GMEL. Linn. Syst. Nat. I, IV, 2063,

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Pennsylvania.—Oliv. Encycl. méth. VI, 637, *Am. sept.*—Turt. Syst. Nat. Linn. II, 547, *Pennsylvania.*—[Œcanthus] De Haan, Bijdr. Kenn. Orthopt. 225, *Noord-Amerika.*

nubilus Say, Journ. Acad. Nat. Sc. Philad. IV, 308;—Ib. Entom. of N. Amer. Ed. LeConte, II, 237, *Arkansas.*

oblongifolius [Tettigonia] Goeze, Entom. Beytr. II, 98, *Das pensylvanische Blatt.*—[Pterophyllus] Harr. Hitchc. Rep. 582; 2d Ed. 576;—Ib. Catal. 56, *Mass.*

obscuratus [Tettigonia] Stoll', Répr. d. Spectres, Saut. à sabre, 20, pl. viii[a], fig. 33, *L'Amérique méridionale.*

obscurus Fabr. Suppl. Entom. Syst. 194, *America borealis.*

occidentalis Thunb. Mém. Acad. St. Petersb. IX, 400, 429, *In Americæ meridionalis, insulis Barthelemi.*

ocellatus Linn. Mus. Adolph. Fred. 82, *America.*—[Tettigonia] Ib. Syst. Nat. 10th Ed. I, 429; 12th Ed. II, 696; 13th Ed. I, 696;—[Tettigonia] Ib. Mus. Lud. Ulr. Reg. 129, *In Indiis.*—[Tettigonia] Müll. Natursyst. V, 429, *In den Indien.*—[Tettigonia] Goeze, Entom. Beytr. II, 60, *Das indianische Flügelauge.*

oxycephalus [Tettigonia] Stoll', Répr. d. Spectres, Saut. à sabre, 19, pl. viii[a], figs. 30–2, *Vraisemblement l'Amérique.*

personatus Uhler, Proc. Entom. Soc. Philad. II, 547, *Kansas.*—Dallas, Zool. Record, I, 573, *Kansas.*

perspicillatus Linn. Cent. Ins. rar. 15;—[Locusta] Ib. Amœn. Acad. VI, 398;—[Locusta] Ib. Syst. Nat. 12th Ed. II, 703; 13th Ed. I, 703, *In Indiis.*—[Locusta] Müll. Linn. Natursyst. V, 446, *Aus den Indien.*—Fabr. Syst. Entom. 293;—Ib. Spec. Ins. I, 371, *In Indiis.*—Ib. Nom. Entom. emend. Ed. 1797, 82; Ed. 1810, 82, *Ind.*—[Locusta] Goeze, Entom. Beytr. II, 82, *Der indianische Brillenträger.*—[Tettigonia] Ib. Entom. Beytr. II, 93, *Der amerikanische Brillenträger.*—[Locusta] Turt. Syst. Nat. Linn. II, 548, *America.*

phthisicus [Mantis] Linn. Syst. Nat. 10th Ed. I, 425;—[Mantis] Ib. Mus. Lud. Ulr. Reg. 110, *In Indiis.*

precarius [Mantis] Linn. Syst. Nat. 10th Ed. I, 426;—[Mantis] Ib. Mus. Lud. Ulr. Reg. 114, *America, Asia.*

pulicarius Burm. Handb. d. Entom. II, 732, *Jamaica.*—[Nemobius] De Haan, Bijdr. Kenn. Orthopt. 226, *Jamaica.*

pumilus Burm. Handb. d. Entom. II, 732, *St. Jean und St. Thomas.*—[Nemobius] De Haan, Bijdr. Kenn. Orthopt. 226, *St. Jean.*

punctulatus [Acheta] Gmel. Linn. Syst. Nat. I, iv, 2063.—Turt. Syst. Nat. Linn. II, 547, *Pennsylvania.*

purpurascens [Locusta] Stoll', Répr. d. Spectres, Saut. de passage, 17, pl. vii[b], fig. 22, *D'Amérique.*

reticularis [Locusta] Turt. Syst. Nat. Linn. II, 551, *Guadeloupe.*

ruber Linn. Mus. Adolph. Fred. 83, *In Indiis.*

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rugosus [Tettigonia] LINN. Syst. Nat. 10th Ed. I, 430; 12th Ed. II, 697; 13th Ed. I, 697; — [Tettigonia] IB. Mus. Lud. Ulr. Reg. 132, *In Indiis.*—[Tettigonia] MÜLL. Linn. Natursyst. V, 430, *In Indien.* — [Tettigonia] GOEZE, Entom. Beytr. II, 61, *Der indianische Runzelbalg.*

rusticus FABR. Syst. Entom. 292, *America.* — IB. Spec. Ins. I, 370, *In Americæ meridionalis insulis.* — IB. Entom. Syst. II, 60, *America.*—IB. Nom. Entom. emend. Ed. 1797, 82; Ed. 1810, 82, *Am.*—[Locusta] GOEZE, Entom. Beytr. II, 107, *Der amerikanische Bauer.*—[Locusta] GMEL. Linn. Syst. Nat. I, IV, 2080, *In insulis Americæ meridionali oppositis.* — TURT. Syst. Nat. Linn. II, 563, *America.*

sanguinipes FABR. Suppl. Entom. Syst. 195, *America borealis.*

serialis THUNB. Mém. Acad. St. Petersb. V, 241; IX, 399, 424, *In insula Barthelemi.*

serratus [Bulla] LINN. Syst. Nat. 10th Ed. I, 427.—SULZ. Kennz. der Ins. Erkl. 21, tab. viii, fig. 58, *Indien.* — [Bulla] LINN. Mus. Lud. Ulr. Reg. 121, *In Indiis.*

serripes FABR. Mant. Ins. I, 236;—IB. Entom. Syst. II, 48, *In Indiis.* —IB. Nom. Entom. emend. Ed. 1797, 81; Ed. 1810, 81, *Ind.* —TURT. Syst. Nat. Linn. II, 558, *America and India.*

siccifolius [Mantis] LINN. Syst. Nat. 10th Ed. I, 425;—[Mantis] IB. Mus. Ulr. Reg. 111, *In Indiis.*

specularis [Tettigonia] GOEZE, Entom. Beytr. II, 93, *Die amerikanische Spiegelträger.*—[Tettigonia] GMEL. Linn. Syst. Nat. I, IV, 2064, *America.*—[Locusta] TURT. Syst. Nat. Linn. II, 549, *America.*

spinulosus [Locusta] LINN. Amœn. Acad. VI, 398; — [Locusta] IB. Syst. Nat. 12th Ed. II, 703; 13th Ed. I, 703, *In Indiis.*—[Locusta] MÜLL. Linn. Natursyst. V, 445, *Aus Indien.*—[Locusta] GOEZE, Entom. Beytr. II, 81, *Der indianische Dornträger.*

squarrosus [Locusta] STOLL', Répr. d. Spectres, Saut. de passage, 19, pl. viii[b], fig. 25, *L'Amérique méridionale.*

strumarius [Mantis] LINN. Syst. Nat. 10th Ed. I, 426, *In Indiis.*

succinctus [Locusta] LINN. Syst. Nat. 12th Ed. II, 699; 13th Ed. I, 699, *Java, Carolina.*—[Locusta] MÜLL. Linn. Natursyst. V, 436, *Java, Carolina.* — FABR. Syst. Entom. 287; — IB. Spec. Ins. I, 362;—IB. Entom. Syst. II, 46, *In Indiis.*—IB. Nom. Entom. emend. Ed. 1797, 81; Ed. 1810, 81, *Ind.*

sulphureus FABR. Spec. Ins. I, 369, *In America boreali.*—IB. Entom. Syst. II, 59, *America.*—IB. Nom. Entom. emend. Ed. 1797, 82; Ed. 1810, 82, *Am.*—[Locusta] GMEL. Linn. Syst. Nat. I, IV, 2079, *In America boreali.*—TURT. Syst. Nat. Linn. II, 563, *America.*

surinamensis FABR. Syst. Entom. 291;—IB. Spec. Ins. I, 367;—IB. Entom. Syst. II, 57, *In America meridionali.*

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talpa Oliv. Encycl. méth. VI, 633, pl. cxxviii, figs. 10–14, *Europe, Am. sept.*

tartaricus Panz. Drury, Ins. 200, tab. xlix, fig. 2, *Virginien, Antigua, New York, Madras in Ostindien, so wie auf Sierra Leon in Afrika zu Hause.*

tessellatus [Acheta] Gmel. Linn. Syst. Nat. I, iv, 2062, *In insula S. Johannæ.*—[Acheta] Turt. Syst. Nat. Linn. II, 546, *St. John Island.*

tricolor [Mantis] Linn. Mus. Lud. Ulr. Reg. 117, *In Indiis.*

trifasciatus Say, Amer. Entom. III, pl. xxxiv;—Ib. Entom. of N. Amer. Ed. LeConte, I, 78, pl. xxxiv, *Arkansas River.*

triops [Tettigonia] Linn. Syst. Nat. 10th Ed. I, 430; 12th Ed. II, 697, 13th Ed. I, 697;—[Tettigonia] Ib. Mus. Lud. Ulr. Reg. 131, *In Indiis.*—[Tettigonia] Müll. Linn. Natursyst. V, 430, *Aus den Indien.*—[Tettigonia] Goeze, Entom. Beytr. II, 60, *Das indianische Dreyauge.*

tuberculatus [Conocephalus] Harr. Hitchc. Rep. 582; 2d Ed. 576; —Ib. Catal. 56, *Mass.*

turcicus Fabr. Nom. Entom. emend. Ed. 1797, 81; Ed. 1810, 81, *Ind.*

unicolor [Bulla] Linn. Syst. Nat. 10th Ed. I, 427; 12th Ed. II, 692; 13th Ed. I, 692, *In Indiis.*—[Bulla] Müll. Linn. Natursyst. V, 419, *Aus den Indien.*—[Bulla] Goeze, Entom. Beytr. II, 45, *Die indianische Grille.*—Oliv. Encycl. méth. VI, 635, *Guadeloupe.*

variegatus [Locusta] Linn. Syst. Nat. 10th Ed. I, 432; 12th Ed. II, 700; 13th Ed. I, 700;—[Locusta] Ib. Mus. Lud. Ulr. Reg. 144, *America.*—[Locusta] Müll. Linn. Natursyst. V, 441, *America.*—Fabr. Syst. Entom. 290;—Ib. Spec. Ins. I, 366; —Ib. Entom. Syst. II, 54;—Ib. Nom. Entom. emend. Ed. 1797, 81; Ed. 1810, 81, *America.*—[Locusta] Goeze, Entom. Beytr. II, 72, *Die amerikanische Buntschecke.*—Herbst, Fuessly, Archiv d. Entom. 1786, 194, tab. liii, fig. 3, *Amerika.* —[Locusta] Gmel. Linn. Syst. Nat. I, iv, 2076, *America.*—Turt. Syst. Nat. Linn. II, 560, *America.*

variolosus [Bulla] Linn. Syst. Nat. 12th Ed. II, 693; 13th Ed. I, 693, *In Indiis.*—[Bulla] Müll. Linn. Natursyst. V, 420, *In Indien.*

vicinus [Platydactylus] De Haan, Bijdr. Kenn. Orthopt. 226, *Buenos Ayres, Cuba.*

virens Thunb. Mém. Acad. St. Petersb. V, 250; IX, 398, 419, *In insula Americes Barthelemi.*

virginianus Fabr. Syst. Entom. 291;—Ib. Spec. Ins. I, 368;—Ib. Entom. Syst. II, 57, *America borealis.*—[Locusta] Goeze, Entom. Beytr. II, 106, *Die virginische Grünader.*—[Locusta] Gmel. Linn. Syst. Nat. I, iv, 2078, *In America boreali.*—Turt. Syst. Nat. Linn. II, 562, *N. America.*

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viridifasciatus [Locusta] GOEZE, Entom. Beytr. II, 115, *Die pensylvanische Grünbinde.*

viridimaculatus [Bulla] GOEZE, Entom. Beytr. II, 84, *Der indianische Grünfleck.*

vitreipennis MARSCH. Annal. Wien. Mus. I, 214, tab. xviii, fig. 6, *Georgia Americes.*— ERICHS. Archiv f. Nat. III, II, 308, *Georgien in Nord-America.*

vorax [Acheta] STOLL', Répr. d. Spectres, Grillons, 8, pl. iv*, figs. 19, 20, *L'Amérique*,— ? EMM. Agric. of N. Y. V, pl. ix, fig. 1, *New York.*

Hadenœcus.

subterraneus SCUDD. Bost. Journ. Nat. Hist. VII, 441, *Mammoth Cave, Kentucky.*

Hapithus.

agitator UHLER, Proc. Entom. Soc. Philad. II, 546, *Maryland.*—DALLAS, Zool. Record, I, 573, *Baltimore.*

Haplopus.

angulatus BURM. Handb. d. Entom. II, 577, *St. Thomas und St. John.*

bispinosus WESTW. Catal. Orthopt. 87, *America, Brasilia.*

Cytherea WESTW. Catal. Orthopt. 86, pl. xviii, fig. 5, *St. Domingo.*

Evadne WESTW. Catal. Orthopt. 85, pl. xviii, fig. 6, *St. Domingo.*

jamaicensis WESTW. Catal. Orthopt. 86, *India occidentalis, Jamaica.*

Ligia WESTW. Catal. Orthopt. 89, pl. xi, figs. 1, 2, *St. Domingo.*

micropterus WESTW. Catal. Orthopt. 87, *Indiæ occident. insulis St. Thomas et St. John; nec Amboyna.* See also *Phasma micropterum.*

spinipes WESTW. Catal Orthopt. 87, *Ind. occident.* See also *Phasma spinipes.*

See also PHASMA.

HARPAX, see MANTIS.

Heterogamia.

mexicana BURM. Handb. d. Entom. II, 490, *Mexiko.*

Heteronemia.

mexicana GRAY, Synops. Phasm. 19, *Mexico.*

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Hetrodes.

spinulosus Fisch. W. Bull. Soc. Imp. Nat. Mosc. 1839, 110, *In Indiis.*

Hippiscus, see Œdipoda.

Hippopedon.

saltator Sauss. Orthopt. nov. amer. II, 25;—Ib. Rev. et Mag. de Zool. 1861, 323, *Mexico.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

Holocompsa.

azteca Sauss. Orthopt. Amér. moy. 151, *La côte du Mexique; province de Vera Cruz.*—Brunn. Blatt. 347, *Mexique.* See also *Corydia azteca.*

collaris Sauss. Orthopt. Amér. moy. 151, *Antilles et l'île Maurice.*—Brunn. Blatt. 347, tab. x, fig. 50, *St. Thomas, Brésil, Cuba.* See also *Blatta collaris* and *Corydia collaris.*

cyanea Sauss. Orthopt. Amér. moy. 150, *L'île Maurice et Cuba.*—Brunn. Blatt. 346, *St. Thomas.* See also *Corydia cyanea.*

See also Blatta and Corydia.

Hololampra, see Blatta.

Homœogamia.

mexicana Brunn. Blatt. 360, tab. xi, fig. 53, *Mexique, Oaxaca.* See also *Polyphaga mexicana.*

See also Polyphaga.

Hymenotes.

rhombea Westw. Proc. Zool. Soc. Lond. V, 130, *Jamaica.*—Guér. Sagra, Hist. nat. de Cuba, 358, pl. xii, fig. 11, *Jamaique.* See also *Acridium rhombeum.*

Sagrai Westw. Mag. Nat. Hist. [n. s.] III, 493, fig. 67[4], on p. 492, *Cuba.*—Guér. Sagra, Hist. nat. de Cuba, 357, 358, pl. xii, fig. 10, *Cuba.*

See also Acridium.

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Ichthydium.

mexicanum Sauss. Rev. et Mag. de Zool. 1859, 390, *Mexico calida.* — Gerst. Archiv f. Nat. XXVI, II, 406;—Ib. Bericht, 1859–60, 50, *Mexico.*

Idolomorpha, see Empusa.

Ischnoptera.

azteca Sauss. Orthopt. nov. amer. III, 9;—Ib. Rev. et Mag. de Zool. 1862, 170, *Mexico calida.*—Ib. Orthopt. Amér. moy. 88, *Mexique, sur la côte du golfe.* — Gerst. Archiv f. Nat. XXIX, II, 354;—Ib. Bericht, 1862, 40, *Aus den heissen Gegenden Mexiko's.*—Brunn. Blatt. 141, *Mexique.*

bicolor Sauss. Orthopt. Amér. moy. 90, *St. Domingue.* — ? Brunn. Blatt. 139, *St. Domingue.*

borealis Brunn. Blatt. 133, *Amérique du Nord.*

buprestoides Brunn. Blatt. 140, *Cuba.*

consobrina Sauss. Orthopt. Amér. moy. 88, *Les parties chaudes du Mexique, Cordova.*

capitata Brunn. Blatt. 140, *Cuba.*

Couloniana Sauss. Orthopt. nov. amer. III, 8;—Ib. Rev. et Mag. de Zool. 1862, 169, *America borealis.*—Ib. Orthopt. Amér. moy. 83, *États unis.*—Gerst. Archiv f. Nat. XXIX, II, 354;—Ib. Bericht, 1862, 40, *Nord Amerika.*

elongata Sauss. Orthopt. Amér. moy. 89, *Les Antilles, St. Domingue.*

lata Brunn. Blatt. 135, *Amérique du Nord ?, St. Domingue.*

mexicana Sauss. Orthopt. nov. amer. III, 9;—Ib. Rev. et Mag. de Zool. 1862, 170, *Mexico calida.*—Ib. Orthopt. Amér. moy. 86, *Les régions chaudes du Mexique, Tuxtla, Alvarado et Cordova.* —Gerst. Archiv f. Nat. XXIX, II, 354;—Ib. Bericht, 1862, 40, *Aus den heissen Gegenden Mexiko's.*—Brunn. Blatt. 141, *Mexique.*

Nortoniana Sauss. Orthopt. nov. amer. III, 8;—Ib. Rev. et Mag. de Zool. 1862, 169, *America borealis.*—Gerst. Archiv f. Nat. XXIX, II, 354;—Ib. Bericht, 1862, 40, *Nord Amerika.*

occidentalis Sauss. Orthopt. Amér. moy. 87, *L'Amérique septentrionale, Nouvelle Orleans.*

pennsylvanica Sauss. Orthopt. Amér. moy. 84, *États unis.*—Brunn. Blatt. 135, *Columbie, Amérique du Nord, Indiana, Maryland.*

punctulata Sauss. Orthopt. Amér. moy. 91, *Saint Domingue.*

rufa Brunn. Blatt. 131, tab. iii, fig. 13, *Brésil, Portorico.*

rufescens Sauss. Orthopt. Amér. moy. 91, *Saint Domingue.* — ? Brunn. Blatt. 139, *St. Domingue.*

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translucida SAUSS. Orthopt. Amér. moy. 85, *L'Amérique septentrionale.*

Uhleriana SAUSS. Orthopt. nov. amer. III, 8;—IB. Rev. et Mag. de Zool. 1862, 169, *Pennsylvania.*—IB. Orthopt. Amér. moy. 82, *États unis, Pennsylvanie.*—GERST. Archiv f. Nat. XXIX, II, 354;—IB. Bericht, 1862, 40, *Pennsylvanien.*

unicolor BRUNN. Blatt. 134, *Massachusetts, Amérique du Nord.*

Kakkerlac.

americana SERV. Ann. Sc. Nat. XXII, 39, *Afrique, Amérique et Europe.*—IB. Orthopt. 68, *Amérique méridionale, les autres parties du monde.*—MACQ. Catal. Mus. Lille, 324, *Amér. mérid.* See also *Blatta americana.*

fuliginosa SERV. Orthopt. 70, *Amérique du Nord.*

orientalis SELLS, Trans. Entom. Soc. Lond. III, 104, *Jamaica.*

See also BLATTA.

Labia.

minor DOUBL. Entom. Mag. V, 279, *Wauborough, New York.* — DOHRN, Entom. Zeit. Stett. XXV, 426, *Europe, Siberien, Amerika, Vereinigten Staaten.*

minuta SCUDD. Bost. Journ. Nat. Hist. VII, 415, *Mass. Virginia.*—GERST. Archiv f. Nat. XXIX, II, 358;—IB. Bericht, 1862, 44, *Mass. Virginien.*

Labidura.

americana DOHRN, Entom. Zeit. Stett. XXIV, 319, *In insulis Haiti, Cuba, in Amer. centrali (Costarica, Columbia occidentali, Venezuela).*

gagatina DOHRN, Entom. Zeit. Stett. XXIV, 320, *In insula Portorico.*

riparia DOHRN, Entom. Zeit. Stett. XXIV, 313, *Mittel und Süd Europa, Madeira, Ost und Süd Afrika, Siberien, Japan, Persien, Ostindien, Neuholland, Westindien und Süd Amerika; (among the special localities given are) Cuba, Mexico.*

See also FORFICULA.

LEPRUS, see ŒDIPODA.
LEUCOPHŒA, see PANCHLORA.
LOBOPHYLLUS, see PHYLLOPTERA.

Loboptera.

indica BRUNN. Blatt. 82, *Indes.*

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Locusta.

abortiva [Chloealtis] HARR. Treat. Ed. 1841–2, 149; Ed. 1852, 160; Ed. 1862, 184, *Mass. N. Hampshire.* — [Chloealtis] ERICHS. Archiv f. Nat. IX, II, 231; — IB. Bericht, 1842, 87, *Mass.*

acuminata DE GEER, Mém. III, 442, pl. xxxvii, fig. 8, *Indes.*— FABR. Syst. Entom. 284, *America.*—IB. Spec. Ins. I, 358, *In America meridionali.*—IB. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *Ind. Eur.*—OKEN, Lehrb. d. Nat. III, I, 451, *Indien.*

æqualis HARR. Hitchc. Rep. 583; 2d Ed. 576;—IB. Catal. 56;—IB. Treat. Ed. 1841–2, 144; Ed. 1852, 155; Ed. 1862, 178, *Mass.*

affinis PAL. DE BEAUV. Insectes, 219, pl. xii, fig. 5, *Saint Domingue.*

agilis DE GEER, Mém. III, 457, pl. xl, fig. 3, *Pensylvanie.*—GOEZE, De Geer, Gesch. Ins. III, 296, tab. xl, fig. 3, *Pennsylvanien.*— HARR. Treat. Ed. 1841–2, 130; Ed. 1852, 141; Ed. 1862, 162, *Pennsylvania, Southern States.*—[Xiphidium] DE HAAN, Bijdr. Kenn. Orthopt. 178, *S. Carolina.*

annulipes [Rhaphidophorus] DE HAAN, Bijdr. Kenn. Orthopt. 178, *St. Domingo.*

apiculata HARR. Hitchc. Rep. 2d Ed. 576;—IB. Catal. 56, *Mass.*

aquilina DE GEER, Mém. III, 450, pl. xxxviii, fig. 6, pl. xxxix, fig. 1, *Indes.*

camellifolia FABR. Syst. Entom. 283;—IB. Spec. Ins. I, 356;—IB. Entom. Syst. II, 35;—IB. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *America.* See also *Gryllus camellifolius.*

carolina CAT. Carol. II, 89, pl. lxxxix (caroliniana), *Carolina.*—MORT. Phil. Trans. XLIV, 603 (caroliniana), *Carolina.* — HARR. Hitchc. Rep. 583; 2d Ed. 576;—IB. Catal. 56;—IB. Encycl. Amer. VIII, 41, *America.*—IB. Treat. Ed. 1841–2, 142; Ed. 1852, 153; Ed. 1862, 176, pl. iii, fig. 3, *Mass.*—EMM. Agric. of N. Y. V, 145, pl. ix, fig. 9, *New York.*—PACK. How to collect, 57;—IB. Rep. Nat. Hist. Maine, 1862, 196, *Maine.* See also *Gryllus carolinus* and *Œdipoda carolina.*

centurio [Rutioderes] WESTW. Drury, Ins. II, 88, pl. xli, fig. 3, *Bay of Honduras, America.* See also *Gryllus centurio.*

cerineipennis HARR. Hitchc. Rep. 583; 2d Ed. 576;—IB. Catal. 56, *Mass.*

citrifolia FABR. Syst. Entom. 282;—IB. Spec. Ins. I, 356;—IB. Entom. Syst. II, 33, *In Indiis.*—IB. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *Ind.*—BILLB. Enum. Ins. 64, *Ind.*

conspersa [Chloealtis] HARR. Treat. Ed. 1841–2, 149; Ed. 1852, 160; Ed. 1862, 184, *Mass.*—[Chloealtis] ERICHS. Archiv f. Nat. IX, II, 230;—IB. Bericht, 1842, 86, *Mass.*

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corallina HARR. Treat. Ed. 1841–2, 142; Ed. 1852, 153; Ed. 1862, 176, *Mass.*—EMM. Agric. of N. Y. V, 146, *New York.*—PACK. How to collect, 57;—IB. Rep. Nat. Hist. Maine, 1862, 196, *Maine.*

coriacea FABR. Spec. Ins. I, 358;—IB. Entom. Syst. II, 40, *In Indiis.*—IB. Nom. Entom. emend. Ed. 1797, 81; Ed. 1810, 81, *Ind.*—[Acanthodis] DE HAAN, Bijdr. Kenn. Orthopt. 178, *Martinique.*

cornuta BLANCH. Hist. Nat. Ins. III, 26, *Amérique méridionale.*

coronata DE GEER, Mém. III, 448, pl. xxxviii, fig. 5, *Elle doit être venue de l'une des deux Indes, ou bien de l'Afrique.*—FABR. Syst. Entom. 285;—IB. Spec. Ins. I, 358;—IB. Entom. Syst. II, 40, *In Indiis.*—IB. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *Ind.*

cubaensis [Rhaphidophorus] DE HAAN, Bijdr. Kenn. Orthopt. 178, 218, *Cuba.*

curtipennis HARR. Hitchc. Rep. 2d Ed. 576;—IB. Catal. 56.—[Chloealtis] IB. Treat. Ed. 1841–2, 149; Ed. 1852, 160; Ed. 1862, 184, pl. iii, fig. 1, *Mass.*—[Chloealtis] ERICHS. Archiv f. Nat. IX, II, 231;—IB. Bericht, 1842, 87, *Mass.*

curvicauda DE GEER, Mém. III, 446, pl. xxxviii, fig. 3, *Pensylvanie.*—GOEZE, De Geer, Gesch. Ins. III, 289, tab. xxxviii, fig. 3, *Pennsylvanien.*—[Phaneroptera] DE HAAN, Bijdr. Kenn. Orthopt. 178, *Vereenigde Staaten.* See also *Gryllus curvicaudus.*

dissimilis [Conocephalus] DE HAAN, Bijdr. Kenn. Orthopt. 178, *Vereenigde Staaten.*

dorsalis [Ephippigera] DE HAAN, Bijdr. Kenn. Orthopt. 178, *S. Carolina.*

dux [Rutioderes] WESTW. Drury, Ins. II, 92, pl. xliv, *Bay of Honduras, Brazil.*—DUNC. Introd. Entom. 257, pl. xv, fig. 2, *Tropical America.* See also *Gryllus dux.*

elongata FABR. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *Ind.*

eucerata HARR. Hitchc. Rep. 583; 2d Ed. 576;—IB. Catal. 56;—IB. Treat. Ed. 1841–2, 145; Ed. 1852, 156; Ed. 1862, 180, *Mass.*

fasciata DE GEER, Mém. III, 458, pl. xl, fig. 4, *Pensylvanie.*

flavovittata PACK. Rep. Nat. Hist. Maine, 1861, 375, *Webster Lake.*

fusca [Xiphidium] DE HAAN, Bijdr. Kenn. Orthopt. 189, *Europa media, Tripoli, Java, Porto-Rico, America media.*

glaberrima [Xiphidium] DE HAAN, Bijdr. Kenn. Orthopt. 178, *S. Carolina.*

glauca [Xiphidium] DE HAAN, Bijdr. Kenn. Orthopt. 178, *S. Carolina.*

guttata [Conocephalus] DE HAAN, Bijdr. Kenn. Orthopt. 178, *Cuba.*

infuscata [Tragocephala] HARR. Treat. Ed. 1841–2, 147; Ed. 1852, 158; Ed. 1862, 181, *Mass.*

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lanceolata PAL. DE BEAUV. Insectes, 219, pl. xii, fig. 4, *Saint Domingue.*

lapidicola [Rhaphidophorus] DE HAAN, Bijdr. Kenn. Orthopt. 178, *Cuba.*

latipennis HARR. Treat. Ed. 1841–2, 144; Ed. 1852, 155; Ed. 1862, 179, *Mass.*—PACK. Rep. Nat. Hist. Maine, 1861, 374, *Mt. Katahdin.*

laurifolia FABR. Syst. Entom. 282;—IB. Spec. Ins. I, 356, *America, Nova Hollandia.*—IB. Entom. Syst. II, 34, *America meridionalis, Nova Hollandia.*—IB. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *Amer. m.*—PAL. DE BEAUV. Insectes, 219, pl. xii, fig. 3, *Saint Domingue.*—[Phylloptera] DE HAAN, Bijdr. Kenn. Orthopt. 178, *St. Domingo.* See also *Gryllus laurifolius.*

leucostoma KIRBY, Faun. bor. amer. IV, 250, *N. America, Lat.* 65°. See also *Acridium leucostomum.*

maritima HARR. Treat. Ed. 1841–2, 143; Ed. 1852, 154; Ed. 1862, 178, *Sandwich, Mass.*

marmorata HARR. Treat. Ed. 1841–2, 145; Ed. 1852, 156; Ed. 1862, 179, *Mass.*

maxillosa FABR. Syst. Entom. 284, *America.*—IB. Spec. Ins. I, 357, *In Americæ insulis.*—IB. Entom. Syst. II, 37;—IB. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *America.* See also *Gryllus maxillosus.*

melanoptera FABR. Syst. Entom. 285;—IB. Spec. Ins. I, 358;—IB. Entom. Syst. II, 40, *In Indiis.*—IB. Nom. Entom. emend. Ed. 1797, 81; Ed. 1810, 81, *Ind.*

miles [Rutioderes] WESTW. Drury, Ins. II, 89, pl. xlii, fig. 2, *Bay of Honduras, America.* See also *Gryllus miles.*

musarum PAL. DE BEAUV. Insectes, 218, pl. xii, fig. 1, *Saint Domingue.*—[Acanthodis] DE HAAN, Bijdr. Kenn. Orthopt. 178, *St. Domingo.*

myrtifolia FABR. Syst. Entom. 282, *America.*—IB. Spec. Ins. I, 356, *In America meridionali.*—IB. Entom. Syst. II, 34, *America.*

nebulosa HARR. Treat. Ed. 1841–2, 146; Ed. 1852, 157; Ed. 1862, 181, *Mass.*—?EMM. Agric. of N. Y. V, 146, pl. ix, fig. 7, *New York, Western Massachusetts.*

nodifrons [Conocephalus] DE HAAN, Bijdr. Kenn. Orthopt. 178, *St. Domingo.*

oblongifolia DE GEER, Mém. III, 445, pl. xxxviii, fig. 2, *Pensylvanie.*—GOEZE, De Geer, Gesch. Ins. III, 288, tab. xxxviii, fig. 2, *Pennsylvanien.*—[Phylloptera] DE HAAN, Bijdr. Kenn. Orthopt. 178, *Vereenigde Staaten.*

obtusa [Conocephalus] DE HAAN, Bijdr. Kenn. Orthopt. 178, *Vereenigde Staaten.*

ocellata FABR. Syst. Entom. 284;—IB. Spec. Ins. I, 357;—IB. Entom.

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Syst. II, 39, *In Indiis.*—Ib. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *Ind.*

pachymera [Ephippigera] De Haan, Bijdr. Kenn. Orthopt. 178, *S. Carolina.*

periscelidis Harr. Hitchc. Rep. 2d Ed. 576;—Ib. Catal. 56, *Mass.*

perspicillata Fabr. Syst. Entom. 283;—Ib. Spec. Ins. I, 357;—Ib. Entom. Syst. II, 36;—Ib. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *America.*—[Acanthodis] De Haan, Bijdr. Kenn. Orthopt. 178, *Mexico.*—[Cyrtophyllus] De Haan, Bijdr. Kenn. Orthopt. 178, *S. Carolina.* See also *Gryllus perspicillatus.*

radiata Harr. Hitchc. Rep. 2d Ed. 576;—Ib. Catal. 56, *Mass.*—[Tragocephala] Ib. Treat. Ed. 1841-2, 148; Ed. 1852, 159; Ed. 1862, 183, *Mass. N. Carolina.*

reticulata Fabr. Entom. Syst. II, 40;—Ib. Nom. Entom. emend. Ed. 1797, 81; Ed. 1810, 81, *Guadeloupe.*

retinervis [Phylloptera] De Haan, Bijdr. Kenn. Orthopt. 178, *Vereenigde Staaten.*

scabricollis [Acanthodis] De Haan, Bijdr. Kenn. Orthopt. 178, *Martinique.*

septentrionalis [Phaneroptera] De Haan, Bijdr. Kenn. Orthopt. 178, *Vereenigde Staaten.*

serrulata Pal. de Beauv. Insectes, 218, pl. xii, fig. 2, *Saint Domingue.*—[Polyancistrus] De Haan, Bijdr. Kenn. Orthopt, 178, *St. Domingo.*

specularis Fabr. Syst. Entom. 284;—Ib. Spec. Ins. I, 357;—Ib. Entom. Syst. II, 38;—Ib. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *America.* See also *Gryllus specularis.*

spinulosa Fabr. Spec. Ins. I, 361;—Ib. Entom. Syst. II, 44, *In Indiis.*—Ib. Nom. Entom. emend. Ed. 1797, 81; Ed. 1810, 81, *Ind.* See also *Gryllus spinulosus.*

sulphurea Harr. Hitchc. Rep. 583; 2d Ed. 576;—Ib. Catal. 56;—Ib. Treat. Ed. 1841-2, 143; Ed. 1852, 154; Ed. 1862, 177, *Mass.*—Emm. Agric. of N. Y. V, 146, *New York.*—Pack. How to collect, 57;—Ib. Rep. Nat. Hist. Maine, 1862, 196, *Maine.* See also *Gryllus sulphureus.*

talpa [Anastostoma] De Haan, Bijdr. Kenn. Orthopt. 178, *Mexiko.*

tartarica ? Westw. Drury, Ins. I, 121, pl. xlix, fig. 2, *Virginie, Antigua, New York, Madras, Sierra Leone, Tartaria and Africa.*

triops Fabr. Syst. Entom. 285;—Ib. Spec. Ins. I, 358;—Ib. Entom. Syst. II, 40, *In Indiis.*—Ib. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *Ind.*

tuberculata Harr. Hitchc. Rep. 583; 2d Ed. 576;—Ib. Catal. 56, *Mass.*—White, Rich. Arc. Search Exp. II, 360, *Borders of Mackenzie and Slave Rivers, Fort Simpson.*

verruculata Kirby, Faun. bor. amer. IV, 250, *N. America, Lat.* 57°. See also *Acridium verruculatum.*

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viridifasciata Harr. Hitchc. Rep. 583; 2d Ed. 576;—Ib. Catal. 56;—[Tragocephala] Ib. Treat. Ed. 1841–2, 147; Ed. 1852, 158; Ed. 1862, 182, *Mass.*—Thomas, Trans. Ill. St. Agric. Soc. V, 451, *Illinois.* See also *Gryllus viridifasciatus.*

vorax [Gnathoclita] De Haan, Bijdr. Kenn. Orthopt. 208, *America.*

——— Gosse, Can. Nat. 278, *Canada.*

See also Acridium, Gryllus and Œdipoda.

Machærocera.

mexicana Sauss. Rev. et Mag. de Zool. 1859, 391, *Mexico calida.*—Gerst. Archiv f. Nat. XXVI, II, 406;—Ib. Bericht, 1859–60, 50.

Mantis.

angulata Fabr. Entom. Syst. II, 13;—Ib. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *Guadeloupe.*—Turt. Syst. Nat. Linn. II, 533, *Guadeloupe.*

angusta Gmel. Linn. Syst. Nat. I, IV, 2055, *Antigua.*—Turt. Syst. Nat. Linn. II, 541, *Antigua.*

antillarum [Stigmatoptera] Sauss. Orthopt. nov. amer. I, 1;—Ib. Rev. et Mag. de Zool. 1859, 60, *St. Thomas.*—Gerst. Archiv f. Nat. XXVI, II, 402;—Ib. Bericht, 1859–60, 46, *St. Thomas.*

azteca [Stigmatoptera] Sauss. Orthopt. nov. amer. I, 1;—Ib. Rev. et Mag. de Zool. 1859, 60, *Mexico.*—Gerst. Archiv f. Nat. XXVI, II, 402;—Ib. Bericht, 1859–60, 46, *Mexiko.*

bicornis Linn. Syst. Nat. 12th Ed. II, 691; 13th Ed. I, 691, *In Indiis.* See also *Gryllus bicornis.*

bidens Fabr. Syst. Entom. 277;—Ib. Spec. Ins. I, 350;—Ib. Entom. Syst. II, 22;—Ib. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *America.* — Goeze, Entom. Beytr. II, 31, *Die amerikanische Fangheuschrekke.* — Gmel. Linn. Syst. Nat. I, IV, 2051, *America.*—Oliv. Encycl. méth. VII, 629, *Amérique.*—Turt. Syst. Nat. Linn. II, 538, *America.*—Licht. Trans. Linn. Soc. Lond. VI, 24, *America.*—De Haan, Bijdr. Kenn. Orthopt. 79, *Brasilia, Mexico, Antilles.*

bicornis Goeze, Entom. Beytr. II, 27, *Die indianische Fangheuschrekke.*

bifasciata De Haan, Bijdr. Kenn. Orthopt. 60, 78, *Cuba.*

bispinosa Fabr. Syst. Entom. 274; — Ib. Spec. Ins. I, 346; — Ib. Entom. Syst. II, 15; — Ib. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *America.*—Goeze, Entom. Beytr. II, 30, *Die amerikanische Fangheuschrekke.* — Gmel. Linn. Syst. Nat. IV, 2054, *America.*—Oliv. Encycl. méth. VII, 633, *Amérique.*—

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SHAW and NODDER, Nat. Misc. IX, 1797, pl. cccxxiii, *America*.—TURT. Syst. Nat. Linn. II, 534, *America*.

calamus FABR. Entom. Syst. II, 13;—IB. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *Ins. St. Cruc.*—TURT. Syst. Nat. Linn. II, 533, *Santa Cruz*.

cancellata FABR. Syst. Entom. 274.—IB. Spec. Ins. I, 347, *In Indiis*.—IB. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *Ind.* GOEZE, Entom. Beytr. II, 30, *Die indianische Fangheuschrekke*.

carolina LINN. Syst. Nat. 12th Ed. II, 691; 13th Ed. I, 691, *Carolina*.—MÜLL. Linn. Natursyst. V, 414, *Carolina*.—GOEZE, Entom. Beytr. II, 26, *Die karolinische Fangheuschrekke*.—GMEL. Linn. Syst. Nat. I, IV, 2053, *Carolina*.—OLIV. Encycl. méth. VII, 632, *Caroline*.—STOLL', Répr. des Spectr. Spectres, 70, pl. XXIV, figs. 91, 92, *Nouvelle Georgie ou Virginie*.—TURT. Syst. Nat. Linn. II, 540 (carolinæ), *Carolina*.—[Stagmatoptera] BURM. Handb. d. Entom. II, 538, *Nordamerika, Südkarolina*.—DE HAAN, Bijdr. Kenn. Orthopt. 60, *Tennessee*.—ZIMM. Archiv f. Nat. IX, 390, *Rockingham, N. Carolina*.—THOMAS, Trans. Ill. St. Agric. Soc. V, 441, *Illinois*. See also *Gryllus carolinus*.

cellularis [Photina] BURM. Handb. d. Entom. II, 532, *Mexico*.

chlorophæa DE HAAN, Bijdr. Kenn. Orthopt. 60, 79, *New York*.—BLANCH, Guér. Mag. de Zool. V, 135, *Watertown, N. York*.

cingulata GOEZE, Entom. Beytr. II, 29, *Die jamaische Fangheuschrekke*.—DRURY, Illustr. Nat. Hist. II, 89, pl. xlix, fig. 2, *Jamaica*.—GMEL. Linn. Syst. Nat. I, IV, 2055, *Jamaica*.—OLIV. Encycl. méth. VII, 635, *Jamaique*.—TURT. Syst. Nat. Linn. II, 540, *Jamaica*.—SERV. Ann. Sc. Nat. XXII, 54, *Jamaique*.—WESTW. Drury, Ins. II, 99, pl. xlix, fig. 2, *Jamaica*.—[Acontistes] BURM. Handb. d. Entom. II, 542, *Jamaica*.—SERV. Orthopt. 197, *Brésil, Mexique, Antilles*.—DE HAAN, Bijdr. Kenn. Orthopt. 60, *Jamaica*.—GUÉR. Sagra, Hist. nat. de Cuba, 349, *Jamaique, St. Domingue, Cuba*.

conspurcata SERV. Orthopt. 190, *Amérique septentrionale*.

cordata FABR. Suppl. Entom. Syst. 190, *In Indiis*.

cubaensis DE HAAN, Bijdr. Kenn. Orthopt. 60, 75, *Cuba*.

domingensis PAL. DE BEAUV. Insectes, 61, pl. xii, fig. 2, *Saint Domingue*.—GUÉR. Sagra, Hist. nat. de Cuba, 348, *Antilles*.

ferox [Stigmatoptera] SAUSS. Orthopt. nov. amer. I, 2;—IB. Rev. et Mag. de Zool. 1859, 60, *Carolina*.—GERST. Archiv f. Nat. XXVII, II, 402;—IB. Bericht, 1859–60, 46.

ferula FABR. Entom. Syst. II, 12;—IB. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *Guadeloupe*.—TURT. Syst. Nat. Linn. II, 533, *Guadeloupe*.

filiformis FABR. Mant. Ins. I, 227;—IB. Entom. Syst. II, 12;—IB. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *Amer. merid.*—GMEL. Linn. Syst. Nat. I, IV, 2048, *America, India*,

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Italia.—Oliv. Encycl. méth. VII, 625, *Amérique méridionale, et dans l'Inde, et peut être dans l'Italie.*

flabellicornis Licht. Trans. Linn. Soc. Lond. VI, 22, *In Indiis.*

fuscata Weber, Obs. Entom. 97, *America.*

fuscifolia [Acanthops] Blanch. Hist. nat. Ins. III, 12, *Cayenne, Am. merid.*

gemmata Stoll', Répr. des Spectr. Spectres, 71, pl. xxiv, fig. 93, *Nouvelle Georgie ou Virginie.*

gigas Goeze, Entom. Beytr. II, 29, *Der vincentinische Riese.*—Drury, Illustr. Nat. Hist. II, 89, pl. 1, *Island of St. Vincent.* See also *Gryllus gigas.*

gongylodes Drury, Illustr. Nat. Hist. I, 129, pl. 1, fig. 2; II, app. *Madras, Philadelphia.*—Panzer, Drury, Ins. 202, tab. 1. fig. 2, *Madras, Virginien.*—Licht. Trans. Linn. Soc. Lond. VI, 21, *In Indiis.* (See Charp. Germ. Zeitsch. f. Entom. V, 291.) See also *Gryllus gongylodes.*

hyalina De Geer, Mém. III, 410, pl. xxxvii, fig. 1, *Amérique.*—Fabr. Syst. Entom. 277;—Ib. Spec. Ins. I, 349;—Ib. Entom. Syst. II, 21;—Ib. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *America.*—Goeze, Entom. Beytr. II, 30, 31, *Der amerikanische Glasflügel.*—Ib. De Geer, Gesch. Ins. III, 266, tab. xxxvii, fig. 1, *America.*—Gmel. Linn. Syst. Nat. I, iv, 2051, *America.* — Stoll', Répr. des Spectr. Spectres, 60, pl. xx, fig. 75, *Amérique.*—Oliv. Encycl. méth. VII, 629, *Amérique.*—Licht. Trans. Linn. Soc. Lond. VI, 30, *America.*—Turt. Syst. Nat. Linn. II, 538, *America.*—Billb. Enum. Ins. 64, *Amer.*—[Photina] Burm. Handb. d. Entom. II, 532, *Mittelamerika.*—De Haan, Bijdr. Kenn. Orthopt. 60, *Centraal Amerika.*

inquinata Serv. Orthopt. 191, *Caroline du Sud.*

irrorata Linn. Syst. Nat. 12th Ed. II, 690; 13th Ed. I, 690, *Carolina.* —Müll. Linn. Natursyst. V, 413, *Carolina.*—Fabr. Syst. Entom. 276, *America.*—Ib. Spec. Ins. I, 348, *In America meridionali.*—Ib. Entom. Syst. II, 19, *America.*—Ib. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *Amer.*—Goeze, Entom. Beytr. II, 25, *Die karolinische Fangheuschrekke.* — Gmel. Linn. Syst. Nat. I, iv, 2050, *In America meridionali.*—Oliv. Encycl. méth. VII, 628, *Amérique méridionale.*—Turt. Syst. Nat. Linn. II, 537, *America.* See also *Gryllus irroratus.*

jamaicensis Drury, Illustr. Nat. Hist. II, 88, pl. xlix, fig. 1, *Jamaica.*—Goeze, Entom. Beytr. II, 29, *Die jamaische Fangheuschrekke.* —Fabr. Spec. Ins. I, 346;—Ib. Entom. Syst. II, 15, *Jamaica.* —Gmel. Linn. Syst. Nat. I, iv, 2054, *Jamaica.*—Oliv. Encycl. méth. VII, 634, *Jamaique.*—Turt. Syst. Nat. Linn. II, 534. *Jamaica.*

latipennis [Stagmatoptera] Burm. Handb. d. Entom. II, 538, *Mexico.* —De Haan, Bijdr. Kenn. Orthopt. 60, *Mexico.*

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linearis DRURY, Illustr. Nat. Hist. I, 130, pl. 1, fig. 3; II, app. *Antigua.* —GOEZE, Entom. Beytr. II, 29, *Die antiguaische Fangheuschrekke.*—PANZER, Drury, Ins. 203, tab. 1, fig. 3, *Antigua.* —FABR. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *Ind.*

luna SERV. Orthopt. 183, *Cordoba.*

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mexicana [Cardioptera] SAUSS. Orthopt. nov. amer. II, 2;—IB. Rev. et Mag. de Zool. 1861, 127, *Mexico calida.*—[Cardioptera] GERST. Archiv f. Nat. XXVIII, II, 311;—IB. Bericht, 1861, 39, *Mexiko.*

minuta DRURY, Illustr. Nat. Hist. II, 75, pl. xxxix, fig. 5, *America.* —GOEZE, Entom. Beytr. II, 28, *Die amerikanische Fangheuschrekke.*—FABR. Spec. Ins. I, 350, *In America meridionali.*—IB. Entom. Syst. II, 24, *Am. merid.*—IB. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *Am. m.*—GMEL. Linn. Syst. Nat. I, IV, 2052, *In America meridionali.*—OLIV. Encycl. méth. VII, 631, *Amérique méridionale aux environs d'Aurelian.*

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oratoria LICHT. Trans. Linn. Soc. Lond. VI, 29, *Ubique in zona torrida et temperata.*

pagana GOEZE, Entom. Beytr. II, 31, *Orleans.*

parva [Thespis] WESTW. Drury, Ins. II, 84, pl. xxxix, fig. 5, *America.* —GMEL. Linn. Syst. Nat. I, IV, 2055, *America.* — OLIV. Encycl. méth. VII, 634, *Amérique.* — TURT. Syst. Nat. Linn. II, 540, *America.*

pectinata DRURY, Illustr. Nat. Hist. I, 128, pl. 1, fig. 1; II, app. *Jamaica.*

pectinicornis FABR. Spec. Ins. I, 347, *In Indiis, Jamaica.*—IB. Entom. Syst. II, 18;—IB. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *Jamaica.*—PANZER, Drury, Ins. 201, tab. 1, fig. 1, *Jamaica.*—HERBST, Fuessly, Archiv d. Ins. 1786, 187, tab. 1, fig. 2, *Jamaica.*—GMEL. Linn. Syst. Nat. I, IV, 2053, *In India, Australi, America, Jamaica.*—OLIV. Encycl. méth. VII, 632, pl. cxxxiii, fig. 3, *Jamaique.*—TURT. Syst. Nat. Linn. II, 536, *Jamaica.*

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phryganoides SERV. Orthopt. 198, *Amérique septentrionale.*—DE HAAN, Bijdr. Kenn. Orthopt. 60, *New York, Cuba.*—IB. Bijdr. Kenn. Orthopt. 80, *Cuba.*

phthisica LINN. Syst. Nat. 12th Ed. II, 689; 13th Ed. I, 689, *In Indiis.*—GOEZE, Entom. Beytr. II, 20, *Die indianische Fangheuschrekke.* See also *Gryllus phthiscus.*

precaria LINN. Syst. Nat. 12th Ed. II, 691; 13th Ed. I, 691, *Amerika, Africa.*—DE GEER, Mém. III, 407, pl. XXXVI, figs. 4–8, *L'Amérique méridionale et particulièrement à Surinam.*—FABR. Syst. Entom. 277;—IB. Spec. Ins. I, 349;—IB. Entom. Syst. II, 20, *America, Africa.*—IB. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *Am.* —HERBST, Fuessly, Archiv d. Ins. 1786, 186, tab. 1, fig. 1, *Amerika.*—GMEL. Linn. Syst. Nat. IV, 2050, *America, Africa.*—OLIV. Encycl. méth. VII, 628, *Amérique, Afrique, Asie.*—LICHT. Trans. Linn. Soc. Lond. VI, 26, *In America* (See Charp. Germ. Zeitsch. Entom. V, 303).—LAM. Hist. nat. Anim. sans Vert. IV, 250; 2e Ed. IV, 451; 3e Ed. II, 155, *L'Amérique méridionale, l'Afrique.*—BILLB. Enum. Ins. 64, *Amer. Afr.*—SERV. Ann. Sc. Nat. XXII, 53, *Amérique et Afrique.*—HAHN, Icon. Orthopt. tab. A, Gen. Mantis, fig. 1, *Amerika, Africa.* See also *Gryllus precarius.*

religiosa BROWNE, Nat. Hist. Jamaica, 433, Mantis, 2, Index, iii, iv, *Jamaica.*

reticulata THUNB. Mém. Acad. St. Petersb, V, 288, *In Ins. Barthelemi.*

rhombica LATR. Humb. et Bonpl. Rec. d'Obs. Zool. II, 103, pl. XXXIX, figs. 2, 3, *L'Amérique équinoxiale.*

siccifolia LINN. Syst. Nat. 13th Ed. I, 689, *In Indiis.*—FABR. Syst. Entom. 274;—IB. Spec. Ins. I, 347;—IB. Entom. Syst. II, 18, *In Indiis.*—IB. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *Ind.*—GOEZE, Entom. Beytr. II, 21, *Das indianische Zitronblatt.* See also *Gryllus siccifolius.*

simulacrum FABR. Entom. Syst. II, 21;—IB. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *America.*—TURT. Syst. Nat. Linn. II, 538, *America.*—LICHT. Trans. Linn. Soc. Lond. VI, 28, *In Indiis.*—BILLB. Enum. Ins. 64, *Amer.*

spinosa FABR. Syst. Entom. 274;—IB. Entom. Syst. II, 14, *In Indiis.*—IB. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810; 79, *Ind.*—GOEZE, Entom. Beytr. II, 30, *Die indianische Fangheuschrekke.*

strumaria LINN. Syst. Nat. 12th Ed. II, 691; 13th Ed. I, 691, *In Indiis.*—MÜLL. Linn. Natursyst. V, 414, *Aus den Indien.*—FABR. Syst. Entom. 274;—IB. Spec. Ins. I, 347;—IB. Entom. Syst. II, 18, *In Indiis.*—IB. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *Ind.*—GOEZE, Entom. Beytr. II, 27, *Der indianische Kropfträger.*—LICHT. Trans. Linn. Soc. Lond. VI, 26, *In*

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Indiis.—Lam. Hist. nat. Anim. sans Vert. IV, 250; 2e Ed. IV, 451; 3e Ed. II, 155, *Les Indes.* See also *Gryllus strumarius.*

Sumichrasti [Cardioptera] Sauss. Orthopt. nov. amer. II, 1;—Ib. Rev. et Mag. de Zool. 1864, 126, *Cordova, Mexico calida.*—[Cardioptera] Gerst. Archiv f. Nat. XXVIII, ii, 311.—Ib. Bericht, 1861, 39, *Mexiko.*

tolteca [Stigmatoptera] Sauss. Orthopt. nov. amer. II, 2;—Ib. Rev. et Mag. de Zool. 1861, 127, *Mexico calida.*—[Stigmatoptera] Gerst. Archiv f. Nat. XXVIII, ii, 311;—Ib. Bericht, 1861, 39, *Mexiko.*

tricolor Linn. Syst. Nat. 12th Ed. II, 691; 13th Ed. I, 691, *In Indiis.* — Goeze, Entom. Beytr. II, 27, *Die indianische Fangheuschrekke.* — Fabr. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *Ind.* See also *Gryllus tricolor.*

urbana Fabr. Syst. Entom. 278;—Ib. Spec. Ins. I, 350;—Ib. Entom. Syst. II, 23, *In Indiis.*—Ib. Nom. Entom. emend. Ed. 1797, 79; Ed. 1810, 79, *Ind.*—Goeze, Entom. Beytr. II, 31, *Die indianische Roststreife.*—Licht. Trans. Linn. Soc. Lond. VI, 27, *In Indiis.*

venusta [Oxypilus] De Haan, Bijdr. Kenn. Orthopt. 60, *St. Domingo.*

viridana Oliv. Encycl. méth. VII, 636, *Ternate, Amboine, Bande, côte de Guinée en Afrique et dans l'Amérique espagnole.*

viridimargo [Photina] Burm. Handb. d. Entom. II, 532, *Mexico.*—De Haan, Bijdr. Kenn. Orthopt. 60, *Mexico.*

See also Gryllus.

Meroncidium.

De Geeri Stål, Orthopt. Eug. Resa, 322, *Insula St. Joseph in sinu Panamensi.*—Gerst. Archiv f. Nat. XXVIII, ii, 316;—Ib. Bericht, 1861, 44, *Insel St. Joseph bei Panama.*

Metriotes.

acuticornis Westw. Catal. Orthopt. 162, *In America æquinoctiali.*

Blanchardi Westw. Catal. Orthopt. 159, *In provincia de Chiquitos.*

Stollii Westw. Catal. Orthopt. 159, *Am. merid.*

Microcentrum.

affiliatum Scudd. Bost. Journ. Nat. Hist. VII, 447, *Mass. Maryland, Key West, Florida, Texas, Nebraska.*

retinervis Scudd. Bost. Journ. Nat. Hist. VII, 446, *North Carolina, District of Columbia.*

thoracicum Scudd. Bost. Journ. Nat. Hist. VII, 447, *Tortugas,*

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Florida.—Gerst. Archiv f. Nat. XXIX, II, 357;—Ib. Bericht, 1862, 43, *Florida.*

Monachidium.

superbum Stål, Öfv. Kongl. Vet. Akad. Förhandl. 1855, 352, *Honduras.*

Monachoda.

Thunbergii Gerst. Archiv f. Nat. XXIV, II, 348;—Ib. Bericht, 1857, 156, *Cuba.*—? Brunn. Blatt. 368, *Ile de Cuba.* See also *Blatta Thunbergii.*

See also Blatta.

Monastria.

biguttata Sauss. Orthopt. Amér. moy. 256, *L'Amérique méridionale, Brésil.*

semialata Sauss. Orthopt. Amér. moy. 258, *L'Amérique méridionale.*

similis Sauss. Orthopt. Amér. moy. 257, *L'Amérique méridionale.*

Myrmecophila.

——— ? Harr. Treat. Ed. 1841–2, 125, *Mass.*—Fitch. 6–9 Rep. 186; —Ib. Trans. N. Y. St. Agric. Soc. XXII, 669, *Mass.*

Nauphoeta.

cinerea Sauss. Orthopt. Amér. moy. 204, *Cuba, Ile de France, cosmopolite.*

lævigata Brunn. Blatt. 285, tab. vii, fig. 33, *Brésil, Ile de Cuba, St. Domingue, Ténériffe, Madère.*

pallida Brunn. Blatt. 286, *Cuba.*

Necroscia.

Cyllarus Westw. Catal. Orthopt. 155, pl. xiii, fig. 2, pl. xiv, fig. 5, *Jamaica.*

Nemobius.

exiguus Scudd. Bost. Journ. Nat. Hist. VII, 429, *Missouri, Minnesota.*

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fasciatus SCUDD. Bost. Journ. Nat. Hist. VII, 430, *Mass. Indiana, S. Carolina.*

toltecus SAUSS. Orthopt. nov. amer. I, 16;—IB. Rev. et Mag. de Zool. 1859, 316, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 404;—IB. Bericht, 1859–60, 48.

vittatus SCUDD. Bost. Journ. Nat. Hist. VII, 430, *Mass. Maine, Connecticut.*—PACK. Rep. Nat. Hist. Maine, 1861, 376, *Chamberlain Farm, Maine.*—GERST. Archiv f. Nat. XXIX, II, 356;—IB. Bericht, 1862, 42, *Massachusetts.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 443, *Illinois.* See also *Acheta vittata.*

See also ACHETA and GRYLLUS.

Nyctobora.

mexicana SAUSS. Orthopt. nov. amer. III, 10;—IB. Rev. et Mag. de Zool. 1862, 227, *Mexico calida.*—IB. Orthopt. Amér. moy. 66, *Les parties chaudes du Mexique, Cordova.*—BRUNN. Blatt. 147, *Mexique.*

Œcanthus.

angustipennis FITCH, 3d–5th Rep. 3d Rep. 95;—IB. Trans. N. Y. St. Agric. Soc. XVI, 411, *New York.*

bipunctatus SERV. Ann. Sc. Nat. XXII, 135, *Pennsylvanie.* See also *Gryllus bipunctatus.*

discoloratus FITCH, 3d–5th Rep. 3d Rep. 95;—IB. Trans. N. Y. St. Agric. Soc. XVI, 411, *New York.*

fasciatus FITCH, 3d–5th Rep. 3d Rep. 96;—IB. Trans. N. Y. St. Agric. Soc. XVI, 412, *New York.*

fuscipes FITCH, 3d–5th Rep. 3d Rep. 95;—IB. Trans. N. Y. St. Agric. Soc. XVI, 411, *New York.*

niveus SERV. Ann. Sc. Nat. XXII, 135, *Pennsylvanie.*—IB. Orthopt. 361, *Amérique septentrionale.*—HARR. Treat. Ed. 1841–2, 124; Ed. 1852, 135; Ed. 1862, 154, figs. 71, 72, *Mass.*—FITCH, 3d–5th Rep. 3d Rep. 86;—IB. Trans. N. Y. St. Agric. Soc. XVI, 404, *New York.*—SCUDD. Bost. Journ. Nat. Hist. VII, 431, *Mass. Connecticut.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 444, *Illinois.* See also *Acheta nivea* and *Gryllus niveus.*

punctulatus FITCH, 3d–5th Rep. 3d Rep. 97;—IB. Trans. N. Y. St. Agric. Soc. XVI, 413, *Southern States.*

See also ACHETA and GRYLLUS.

Œdipoda.

æqualis ERICHS. Archiv f. Nat. IX, II, 230;—IB. Bericht, 1842, 86, *Mass.*—UHLER, Harr. Treat. Ed. 1862, 178, *Mass.*—SCUDD.

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Can. Nat. VII, 287, *Southern shore of Lake Winnipeg.*—Ib. Bost. Journ. Nat. Hist. VII, 470, *Mass. Conn. Minnesota, Red River, British America.*

azteca Sauss. Orthopt. nov. amer. II, 28;—Ib. Rev. et Mag. de Zool. 1861, 397, *Mexico.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

carolina Burm. Handb. d. Entom. II, 643, *Nordamerika.*—Serv. Orthopt. 722, *Amérique septentrionale, Caroline, Pennsylvanie.*—[Locusta] Erichs. Archiv f. Nat. XIII, II, 140;—Ib. Bericht, 1846, 76.—Uhler, Harr. Treat. Ed. 1862, 176, *Mass.*—Scudd. Bost. Journ. Nat. Hist. VII, 468, *Mass. Maine, Connecticut.*—Pack. Rep. Nat. Hist. Maine, 1861, 373, *Mattamiscontis, Maine.* See also *Acridium carolinum.*

corallina Erichs. Archiv f. Nat. IX, II, 229;—Ib. Bericht, 1842, 85, *Mass.*

corallipes Hald. Stansb. Expl. Utah, 371, pl. x, fig. 2, *Utah.*—Schaum, Archiv f. Nat. XVIII, II, 271;—Ib. Bericht, 1852, 131, *Utah.*—Taylor, Report Smiths. Inst. 1858, 206, *Salt Lake country.*

costalis Scudd. Bost. Journ. Nat. Hist. VII, 473, *Texas.*—Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Texas.*

discoidea Serv. Orthopt. 724, *Brésil, Amérique septentrionale, Georgie, Philadelphie.*—Scudd. Bost. Journ. Nat. Hist. VII, 469, *N. Carolina, Southern States.* See also *Acridium discoideum.*

elephas [Leprus] Sauss. Orthopt. nov. amer. II, 28;—Ib. Rev. et Mag. de Zool. 1861, 398, *Mexico.*—[Leprus] Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

eucerata Erichs. Archiv f. Nat. IX, II, 230;—Ib. Bericht, 1842, 86, *Mass.*—Uhler, Harr. Treat. Ed. 1862, 180, *Mass.*—Scudd. Bost. Journ. Nat. Hist. VII, 472, *Mass. Connecticut.*

fenestralis Burm. Germ. Zeitsch. f. Entom. II, 54, *Nord Amerika.*—Serv. Orthopt. 726, *Amérique septentrionale.*

haitensis [Sphingonotus] Sauss. Orthopt. nov. amer. II, 26;—Ib. Rev. et Mag. de Zool. 1861, 323, *Haïti.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

latipennis Erichs. Archiv f. Nat. IX, II, 230;—Ib. Bericht, 1842, 86, *Mass.*—Uhler, Harr. Treat. Ed. 1862, 178, *Mass.*—Pack. Rep. Nat. Hist. Maine, 1861, 373, *Mattamiscontis, Maine.*

maritima Erichs. Archiv f. Nat. IX, II, 229;—Ib. Bericht, 1842, 85, *Mass.*—Uhler, Harr. Treat. Ed. 1862, 178, *Sandwich, Mass.*—Scudd. Bost. Journ. Nat. Hist. VII, 472, *Seashore of Mass. Connecticut.*

marmorata Erichs. Archiv f. Nat. IX, II, 230;—Ib. Bericht, 1842, 86, *Mass.*—Uhler, Harr. Treat. Ed. 1862, 179, *Mass.*—Scudd. Bost. Journ. Nat. Hist. VII, 472, *Mass.*

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mexicana Sauss. Orthopt. nov. amer. II, 27;—Rev. et Mag. de Zool. 1861, 397, *Mexico.*—Gerst. Archiv f. Nat. XXVIII, II, 317; —Ib. Bericht, 1861, 45, *Mexiko.*

musica Serv. Orthopt. 720, *Nouvelle Hollande, Indes, Cap de Bonne Espérance.*

nebulosa Erichs. Archiv f. Nat. IX, II, 230;—Ib. Bericht, 1842, 86, *Mass.*—Uhler, Harr. Treat. Ed. 1862, 181, *Mass.*

obliterata Germ. Burm. Handb. d. Entom. II, 643, *Nordamerika.*

ocelote [Hippiscus] Sauss. Orthopt. nov. amer. II, 29;—Ib. Rev. et Mag. de Zool. 1861, 398, *Mexico.*—[Hippiscus] Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

pallidipennis Burm. Handb. d. Entom. II, 641, *Mexiko, aus der Gegend bei Zimapan.*

pardalina Sauss. Orthopt. nov. amer. II, 27;—Ib. Rev. et Mag. de Zool. 1861, 324, *Mexico.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

pellucida Scudd. Bost. Journ. Nat. Hist. VII, 472, *Mass. Conn. Vermont, Maine.*—Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Nord Amerika.*

phœnicoptera Germ. Burm. Handb. d. Entom. II, 643, *Nordamerika.* —Scudd. Bost. Journ. Nat. Hist. VII, 468, *Mass. Maine, Connecticut.* See also *Acridium phœnicopterum.*

rugosa Scudd. Bost. Journ. Nat. Hist. VII, 469, *Mass. Maine.*— Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Nord Amerika.*

sordida Burm. Handb. d. Entom. II, 643, *Pennsylvania.*—Scudd. Bost. Journ. Nat. Hist. VII, 473, *Mass. Conn. Maine.* See also *Acridium sordidum.*

sulphurea Burm. Handb. d. Entom. II, 643, *Carolina.*— Uhler, Harr. Treat. Ed. 1862, 177, *Mass.*—Scudd. Bost. Journ. Nat. Hist. VII, 470, *Mass. Maine, Conn.* See also *Acridium sulphureum.*

Sumichrasti [Sphingonotus] Sauss. Orthopt. nov. amer. II, 26;— Ib. Rev. et Mag. de Zool. 1861, 324, *Mexico calida.* — Gerst. Archiv f. Nat. XXVIII, II, 317; — Ib. Bericht, 1861, 45, *Mexico.*

tolteca Sauss. Orthopt. nov. amer. II, 28;—Ib. Rev. et Mag. de Zool. 1861, 397, *Mexico.*—Gerst. Archiv f. Nat. XXVIII, 317;— Ib. Bericht, 1861, 45, *Mexiko.*

venusta Stål. Orthopt. Eug. Resa, 344, *San Francisco, Californiæ.* — Gerst. Archiv f. Nat. XXVIII, II, 319;—Ib. Bericht, 1861, 47, *San Francisco.*

verruculata Scudd. Can. Nat. VII, 287, *Point Wigwam, Lake Winnipeg.* — Ib. Bost. Journ. Nat. Hist. VII, 471, *Mass. New Hampshire, White Mts. of N. Hampshire, Maine, Lake Winnipeg, Saguenay River, Canada East.*

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virginiana BURM. Handb. d. Entom. II, 645, *Nordamerika.* See also *Acridium virginianum.*

xanthoptera GERM. Burm. Handb. d. Entom. II, 643, *Carolina.*—SCUDD. Bost. Journ. Nat. Hist. VII, 469, *Mass. Missouri.* See also *Acridium xanthopterum.*

See also ACRIDIUM.

Ommatolampis.

mexicana SAUSS. Rev. et Mag. de Zool. 1859, 393, *Mexico frigida, Toluca.*

Yersinii SAUSS. Rev. et Mag. de Zool. 1859, 394, *America meridionalis ?*

Opomala.

bivittata SERV. Orthopt. 589, *Amérique septentrionale.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 447, *Illinois.* See also *Acridium bivittatum.*

brachyptera SCUDD. Bost. Journ. Nat. Hist. VII, 454, *Massachusetts.*—GERST. Archiv f. Nat. XXIX, II, 358;—IB. Bericht, 1862, 44, *Massachusetts.*

brevipennis THOMAS, Trans. Ill. St. Agric. Soc. V, 451, *Illinois.*

marginicollis SERV. Orthopt. 591, *Amérique septentrionale.* See also *Acridium marginicolle.*

mexicana SAUSS. Orthopt. nov. amer. II, 6;—IB. Rev. et Mag. de Zool. 1861, 156, *Mexico.*—GERST. Archiv f. Nat. XXVIII, II, 316;—IB. Bericht, 1861, 44, *Mexiko.*

punctipennis SERV. Orthopt. 590, *Amérique septentrionale.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 447, *Illinois.* See also *Acridium punctipenne.*

varipes SERV. Orthopt. 588, *Amérique septentrionale.* See also *Acridium varipes.*

See also ACRIDIUM.

Orchelimum.

agile SCUDD. Bost. Journ. Nat. Hist. VII, 453, *Maryland, Illinois.*

concinnum SCUDD. Bost. Journ. Nat. Hist. VII, 452, *Cape Cod.*—GERST. Archiv f. Nat. XXIX, II, 357;—IB. Bericht, 1862, 43, *Cape Cod.*

glaberrimum SCUDD. Bost. Journ. Nat. Hist. VII, 453, *Conn. Georgia.*

glaucum SERV. Orthopt. 524, *Amérique septentrionale.*

gracile HARR. Treat. Ed. 1841–2, 131; Ed. 1852, 142; Ed. 1862, 163, fig. 78, *Mass.*—ERICHS. Archiv f. Nat. IX, II, 227;—IB. Be-

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richt, 1842, 83, *Mass.*—FITCH, Amer. Journ. Agric. and Sc. VI, 146, *New York.*—PACK. Rep. Nat. Hist. Maine, 1861, 376, *Chamberlain Farm, Maine.*

herbaceum SERV. Orthopt. 524, *Amérique septentrionale.*

longipennis SCUDD. Bost. Journ. Nat. Hist. VII, 453, *Texas.*—GERST. Archiv f. Nat. XXIX, II, 357;—IB. Bericht, 1862, 43, *Texas.*

vulgare HARR. Treat. Ed. 1841–2, 130; Ed. 1852, 142; Ed. 1862, 162, fig. 77, *Mass.*—ERICHS. Archiv f. Nat. IX, II, 227;—IB. Bericht, 1842, 83, *Mass.*—FITCH, Amer. Journ. Agric. and Sc. VI, 146, *New York.*—SCUDD. Bost. Journ. Nat. Hist. VII, 452, *Mass. Conn. Cape Cod.*—GERST. Archiv f. Nat. XXIX, II, 357;—IB. Bericht, 1862, 43, *Cape Cod.*

Orchesticus.

americanus SAUSS. Orthopt. nov. amer. I, 5;—IB. Rev. et Mag. de Zool. 1859, 201, *America borealis, Tennessee.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Tennessee.*

Orocharis.

saltator UHLER, Proc. Entom. Soc. Philad. II, 545, *Maryland.*—DALLAS, Zool. Record, I, 573, *Baltimore.*

OROPHUS, see PHYLLOPTERA.
OXYA, see ACRIDIUM.

Oxycoryphus.

aztecus SAUSS. Orthopt. nov. amer. II, 17;—IB. Rev. et Mag. de Zool. 1861, 315, *Mexico.*—GERST. Archiv f. Nat. XXVIII, II, 317;—IB. Bericht, 1861, 45, *Mexiko.*

Burkhartianus SAUSS. Orthopt. nov. amer. II, 16;—IB. Rev. et Mag. de Zool. 1861, 314, *Mexico.*—GERST. Archiv f. Nat. XXVIII, II, 317;—IB. Bericht, 1861, 45, *Mexiko.*

mexicanus SAUSS. Orthopt. nov. amer. II, 17;—IB. Rev. et Mag. de Zool. 1861, 314, *Mexico.*—GERST. Archiv f. Nat. XXVIII, II, 317;—IB. Bericht, 1861, 45, *Mexiko.*

Montezuma SAUSS. Orthopt. nov. amer. II, 18;—IB. Rev. et Mag. de Zool. 1861, 316, *Mexico.*—GERST. Archiv f. Nat. XXVIII, II, 317;—IB. Bericht, 1861, 45, *Mexiko.*

toltecus SAUSS. Orthopt. nov. amer. II, 16;—IB. Rev. et Mag. de Zool. 1861, 314, *Mexico altior.*—GERST. Archiv f. Nat. XXVIII, II, 317;—IB. Bericht, 1861, 45, *Mexiko.*

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totonacus Sauss. Orthopt. nov. amer. II, 17;—Ib. Rev. et Mag. de Zool. 1861, 315; *Mexico.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

zapotecus Sauss. Orthopt. nov. amer. II, 18;—Ib. Rev. et Mag. de Zool. 1861, 316, *Mexico.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

Oxyphyma.

Jurinei Sauss. Orthopt. nov. amer. II, 7;—Ib. Rev. et Mag. de Zool. 1861, 157, *America meridionalis ?*

Oxypilus, see Mantis.

Pamphagus.

lateralis Thunb. Mém. Acad. St. Petersb. V, 260, *In Indiis.*

Panchlora.

antillarum Sauss. Orthopt. nov. amer. III, 14;—Ib. Rev. et Mag. de Zool. 1862, 230, *Cuba.*—Ib. Orthopt. Amér. moy. 193, *Cuba.*—Gerst. Archiv f. Nat. XXIX, II, 354;—Ib. Bericht, 1862, 40, *Cuba.*—Brunn. Blatt. 275, *Cuba.*

azteca Sauss. Orthopt. nov. amer. III, 13;—Ib. Rev. et Mag. de Zool. 1862, 230, *Mexico calida.*—Ib. Orthopt. Amér. moy. 198, pl. ii, fig. 31, *Les terres chaudes du Mexique ; dans la Cordillière de Cordova.*—Gerst. Archiv f. Nat. XXIX, II, 354;—Ib. Bericht, 1862, 40, *Aus dem heissen Mexiko.*

cubensis Sauss. Orthopt. nov. amer. III, 13;—Ib. Rev. et Mag. de Zool. 1862, 230;—Ib. Orthopt. Amér. moy. 192, *Cuba.*—Gerst. Archiv f. Nat. XXIX, II, 354;—Ib. Bericht, 1862, 40, *Cuba.*

exoleta Brunn. Blatt. 272, *Brésil, Jamaique, Venezuela, Vera Cruz, Surinam.*

hyalina Sauss. Orthopt. nov. amer. III, 14;—Ib. Rev. et Mag. de Zool. 1862, 231, *Guatemala.*—Gerst. Archiv f. Nat. XXIX, II, 354;—Ib. Bericht, 1862, 40, *Guatemala.*—Brunn. Blatt, 275, *Guatemala.*

indica Sauss. Orthopt. Amér. moy. 88, *Cosmopolite ; Antilles, Cuba, Haiti, États unis et Mexique (Orizaba), Brésil, île de France et Ceylan.*

lactea Brunn. Blatt. 277, *Oaxaca, Mexique.*

Lancadon Sauss. Blatt. nov. 24;—Ib. Rev. et Mag. de Zool. 1864, 342;—Ib. Orthopt. Amér. moy. 194, pl. ii, fig. 29, *Guatemala.*

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maderæ Sauss. Orthopt. Amér. moy. 202, *Les Antilles, le Mexique, presque cosmopolite; Brésil, Sénégal, Madère, Indes, probablement originaire de l'Afrique.* See also *Blatta maderæ.*

mexicana Sauss. Orthopt. nov. amer. III, 14;—Ib. Rev. et Mag. de Zool. 1862, 231, *Mexico temperata.*—Ib. Orthopt. Amér. moy. 197, *Les régions tempérées du Mexique; dans les vallées du versant orientale de la Cordillière.*

nivea Brunn. Blatt. 274, *Cuba, Venezuela.*

Poeyi Sauss. Orthopt. nov. amer. III, 14;—Ib. Rev. et Mag. de Zool. 1862, 230, *Cuba.*—Ib. Orthopt. Amér. moy. 194, *Cuba et les terres tempérées du Mexique.*—Gerst. Archiv f. Nat. XXIX, II, 354;—Ib. Bericht, 1862, 40, *Cuba.*

surinamensis Sauss. Orthopt. Amér. moy. 188, *La nouvelle Orleans, les Antilles, l'île de Cuba, à ce quil parait, tous les continents aux Indes orientales et l'île Maurice; dans les serres du Jardin des Plantes à Paris; nous la croyons d'origine asiatique.*—[Leucophæa] Brunn. Blatt. 278, tab. vii, fig. 32, *Brésil, Cayenne, Martinique, Mexique, Sénégal, Amoy, Java, îles Philippines, Paris.* See also *Blatta surinamensis.*

virescens Sauss. Orthopt. Amér. moy. 190, *Les Antilles; versant orientale du Mexique; Cuba et Brésil, Surinam.* See also *Blatta virescens.*

viridis Burm. Handb. d. Entom. II, 506, *Westindien.*— Sauss. Orthopt. Amér. moy. 193, *Les Indes occidentales.*—Brunn. Blatt. 273, *Amérique méridionale.*

zendala Sauss. Orthopt. nov. amer. III, 14;—Ib. Rev. et Mag. de Zool. 1862, 231, *Guatemala.*—Ib. Orthopt. Amér. moy. 196, pl. ii, fig. 30, *Guatemala, Izabel.*—Gerst. Archiv f. Nat. XXIX, II, 354;—Ib. Bericht, 1862, 40, *Guatemala.*—Brunn. Blatt. 276, *Guatemala.*

See also Blatta.

Paragryllus.

Martinii Guér. Iconogr. Règne Anim. Ins. 329, *Pointe-à-Pitre.*—Ib. Sagra, Hist. nat. de Cuba, 354, *Point à Pitre.*—Erichs. Archiv f. Nat. XIII, II, 138;—Ib. Bericht, 1846, 74, *Pointe à Pitre.*

Paratropes.

æquatorialis Sauss. Orthopt. Amér. moy. 61, *Amérique méridionale; les plâteaux de la République de l'Equateur.*

histrio Sauss. Orthopt. nov. amer. III, 12;—Ib. Rev. et Mag. de Zool. 1862, 229, *America borealis.*—Ib. Orthopt. Amér. moy.

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58, pl. i, fig. 5, *Amérique méridionale.* — Brunn. Blatt. 152, *Amérique méridionale.*

mexicana Brunn. Blatt. 151, tab. iv, fig. 15, *Oaxaca, Mexique.*

Paroccanthus.

mexicanus Sauss. Orthopt. nov. amer. I, 16;—Ib. Rev. et Mag. de Zool. 1859, 317, *Mexico.*—Gerst. Archiv f. Nat. XXVI, II, 404;—Ib. Bericht, 1859–60, 48, *Mexiko.*

Pedies.

virescens Sauss. Orthopt. nov. amer. II, 8;—Ib. Rev. et Mag. de Zool. 1861, 157, *Mexico.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

Pegasidion.

volitans Sauss. Orthopt. nov. amer. II, 22; — Ib. Rev. et Mag. de Zool. 1861, 319, *Mexico orientalis.* — Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

Periplaneta.

americana Burm. Handb. d. Entom. II, 503, *Ursprünglich in wärmeren Amerika, jetzt durch den Handel überall zwischen den Tropen.*—Fisch. Orthopt. Europ. 116, *Haec species e sua patria genuina h. e. ex Americæ regionibus tepidioribus, cum mercibus, non solum in omnes orbis partes, quæ tropicæ vocanta, advecta est, verum in Europæ quoque urbibus.*—Scudd. Bost. Journ. Nat. Hist. VII, 416, *Mass. Indiana, Mexico, Texas.*—Gerst. Peters, Handb. d. Zool. Arthr. 45, *Ursprünglich in Mittel und Süd Amerika.*—[Cacerlaca] Sauss. Orthopt. Amér. moy. 71, *Toutes les contrées du monde, quoique d'origine américaine. Au Mexique, cette espèce est peutêtre la plus commune, et elle habite à toutes les altitudes. Je l'ai prise sur la côte à Tampico et à Tuspan, dans la Cordillière à Mextillan, sur le plâteau à Tesuillan, etc. J'ai aussi pris nombre d'individus à Cuba et à Haïti. Cette Blatte s'étend dans l'Amérique du Nord jusque près du Canada; elle a aussi envahi les ports de Mer de l'Europe.*—Brunn. Blatt. 232, tab. v, fig. 24, *Dans le monde entier.* See also *Blatta americana.*

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australasiæ [Cacerlaca] SAUSS. Orthopt. Amér. moy. 72, *L'Amérique. Commune aux Antilles, à Cuba, d'où elle arrive souvent avec des boîtes de cigares. J'ai pris ce kakerlac au Mexique dans le Cordillière orientale, et je possède des individus qui ont été pris au Pérou.* — BRUNN. Blatt. 233, *Ile de Madère, île St. Thomé sur la côte occidentale de l'Afrique et des Indes occidentales, Colombie, Batavia, Padang, Banjermassing, Suède, Belgique.* See also *Blatta australasiæ.*

decorata [Stylopyga] BRUNN. Blatt. 224, *Mexique, Acapulco, Venezuela, Buenos Ayres, côte orientale d'Afrique, Zanzibar, Madagascar, Madras.*

fuliginosa BRUNN. Blatt. 238, *Amérique du Nord.*

mysteca SAUSS. Orthopt. nov. amer. III, 9;—IB. Rev. et Mag. de Zool. 1862, 171, *Mexico temperata.*—IB. Orthopt. Amér. moy. 77, *Les terres tempérées du Mexique, Oaxaca.*—GERST. Archiv f. Nat. XXIX, II, 354;—IB. Bericht, 1862,40, *Aus den gemässigten Strichen Mexiko's.*

occidentalis [Stylopyga] SAUSS. Blatt. nov. 14;—IB. Rev. et Mag. de Zool. 1864, 318, *Antillæ.*—IB. Orthopt. Amér. moy. 4, *Les Antilles, la Martinique.* — [Stylopyga] GERST. Archiv f. Nat. XXX, II, 430;—IB. Bericht, 1863–4, 124, *Antillen.*—DALLAS, Zool. Record, I, 571, *W. Indies.*

orientalis GERST. Peters, Handb. d. Zool. II, 45, *Ueber Europa allgemein verbreitet, wohin sie aus Vorderasien eingewandert sein soll; auch in Nord Amerika.*—[Stylopyga] SAUSS. Orthopt. Amér. moy. 73, *Cette espèce a déjà fait invasion aux États unis. J'en ai reçu des individus de New York.*—[Stylopyga] BRUNN. Blatt. 226, *Principalement l'Asie et l'Europe. Elle abonde dans les Indes orientales, ainsi que dans l'Asie mineure, rare sur les côtes de la Méditerranée; également rare en Italie et dans l'Espagne méridionale. Algérie, toute l'Europe centrale, l'Amérique du Nord, Chile, Buenos Ayres, Nouvelle Hollande.*

See also BLATTA.

PETALOPTERA, see PHYLLOPTERA.

Petasodes.

dominica SAUSS. Orthopt. Amér. moy. 261, *Amérique méridionale, Brésil.*

Pezotettix.

borealis SCUDD. Can. Nat. VII, 286, *Pas on Saskatchewan River, Lake Winnipeg, Anticosti.*—IB. Bost. Journ. Nat. Hist. VII, 464, *Minnesota, Saskatchewan River, Lake Winnipeg, Anticosti.*—

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Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Nord Amerika.*

edax Sauss. Orthopt. nov. amer. II, 11;—Ib. Rev. et Mag. de Zool. 1861, 161, *Mexico temperata.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Carolina.*

glacialis Scudd. Bost. Journ. Nat. Hist. VII, 630, *White Mts. N. Hampshire.* — Gerst. Archiv f. Nat. XXX, II, 437; — Ib. Bericht, 1863–4, 131, *White Mountains.*

longicornis Sauss. Orthopt. nov. amer. II, 9;—Ib. Rev. et Mag. de Zool. 1861, 159, *Carolina.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Carolina.*

mexicana Sauss. Orthopt. nov. amer. II, 10;—Ib. Rev. et Mag. de Zool. 1861, 160, *Mexico temperata.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

Scudderi Uhler, Proc. Entom. Soc. Philad. II, 555, *Maryland, Southern Illinois.*—Dallas, Zool. Record, I, 574, *Baltimore.*

septentrionalis Sauss. Orthopt. nov. amer. II, 10;—Ib. Rev. et Mag. de Zool. 1861, 159, *Labrador.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Labrador.*

Sumichrasti Sauss. Orthopt. nov. amer. II, 11;—Ib. Rev. et Mag. de Zool. 1861, 160, *Mexico.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

Zimmermanni Sauss. Orthopt. nov. amer. II, 9;—Ib. Rev. et Mag. de Zool. 1861, 159, *Carolina.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. 1861, 45, *Carolina.*

Phalangopsis.

annulipes Serv. Ann. Sc. Nat. XXII, 167, *Port au Prince.*—Ib. Orthopt. 369, *Port au Prince.*—Oken, Isis, 1835, 174, *Prinzenhaven.*—Blanch. Hist. nat. Ins. III, 32, *Port au Prince.*—Guér. Sagra, Hist. nat. de Cuba, 353, pl. xii, fig. 9, *Cuba.* See also *Gryllus annulipes.*

azteca Sauss. Orthopt. nov. amer. I, 12;—Ib. Rev. et Mag. de Zool. 1859, 209, *Mexico.*—Gerst. Archiv f. Nat. XXVI, II, 405;—Ib. Bericht, 1859–60, 49, *Mexiko.*

brevipes [Daihinia] Hald. Proc. Amer. Ass. Adv. Sc. II, 346, *River Platte.*—Schaum, Archiv f. Nat. XVIII, II, 241;—Ib. Bericht, 1851, 137, *Amerika.*

gracilipes [Daihinia] Hald. Proc. Amer. Ass. Adv. Sc. II, 346, *Pennsylvania.*—Schaum, Archiv f. Nat. XVIII, II, 241;—Ib. Bericht, 1851, 137, *Amerika.*

lapidicola Burm. Handb. d. Entom. II, 723, *Virginien und Süd Karolina.*—Uhler, Harr. Treat. Ed. 1862, 155, *Mass.*

longipes Serv. Ann. Sc. Nat. XXII, 167, *Amérique méridionale.*—Ib.

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Orthopt. 369, pl. xii, fig. 1, *Amérique méridionale.*—BURM. Handb. d. Entom. II, 722, *Mittel Amerika.*—BLANCH. Hist. nat. Ins. III, 31, *Amérique méridionale.*

maculata HARR. Treat. Ed. 1852, 137; Ed. 1862, 155, fig. 73, *Mass.*

robustus [Daihinia] HALD. Proc. Amer. Ass. Adv. Sc. II, 346, *N. America.*—SCHAUM, Archiv f. Nat. XVIII, II, 241;—IB. Bericht, 1851, 137, *Amerika.*

scabripes HALD. Proc. Acad. Nat. Sc. Philad. VI, 364, *Selma, Alabama.*—GERST. Archiv f. Nat. XX, II, 246;—IB. Bericht, 1853, 58, *Alabama.*

——— THOMPS. Ann. Mag. Nat. Hist. XIII, 113, *Mammoth Cave in Kentucky.*—HALD. Stansb. Expl. Utah, 373, *Utah.*

See also GRYLLUS.

Phaneroptera.

alipes WESTW. Arc. Entom. II, 87, pl. lxx, fig. 1, *Colombia, Mexico.*—ERICHS. Archiv f. Nat. XI, II, 127;—IB. Bericht, 1844, 63, *Colombien, Mexiko.*

angustifolia HARR. Treat. Ed. 1841-2, 129; Ed. 1852, 140; Ed. 1862, 161, fig. 76, *Mass.*—ERICHS. Archiv f. Nat. IX, II, 227;—IB. Bericht, 1842, 83, *Mass.*—EMM. Agric. of N. Y. V, 145, pl. ix, fig. 2, *New York.*—JAEG. N. Amer. Ins. 1854, 154; 1859, 109, *N. America.*—PACK. How to collect, 56;—IB. Rep. Nat. Hist. Maine, 1862, 196, *Maine.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 445, *Illinois.*

curvicauda BURM. Handb. d. Entom. II, 690, *Carolina.*—SERV. Ann. Sc. Nat. XXII, 159, *Pennsylvanie.*—UHLER, Harr. Treat. Ed. 1862, 161, *Middle and Southern States.*—SCUDD. Can. Nat. VII, 285, *Red River Settlements, British America.*—IB. Bost. Journ. Nat. Hist. VII, 448, *Mass. Conn. Maine, Red River Settlements.* See also *Locusta curvicauda.*

hystrix WESTW. Arc. Entom. II, 88, pl. lxx, fig. 2, *Columbia.*—ERICHS. Archiv f. Nat. XI, II, 127;—IB. Bericht, 1844, 63, *Columbien.*

mexicana SAUSS. Orthopt. nov. amer. II, 4;—IB. Rev. et Mag. de Zool. 1861, 129, *Mexico.*—GERST. Archiv f. Nat. XXVIII, II, 316;—IB. Bericht, 1861, 44, *Mexiko* (erroneously quoted under the genus Phylloptera).

septentrionalis SERV. Orthopt. 416, *Amérique septentrionale.* See also *Locusta septentrionalis.*

tolteca SAUSS. Orthopt. nov. amer. I, 5;—IB. Rev. et Mag. de Zool. 1859, 201, *Mexico.*—GERST. Archiv f. Nat. XXVI, 405;—IB. Bericht, 1859-60, 49, *Mexiko.*

See also LOCUSTA.

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Phasma.

acuticorne Gray, Synops. Phasm. 26, *In America æquinoctiali.*

angulatum Fabr. Suppl. Entom. Syst. 187, *Guadeloupe.*—Pal. de Beauv. Insectes, 166, pl. xiv, fig. 4, *Saint Domingue.*—[Diapherodes] De Haan, Bijdr. Kenn. Orthopt. 102, *Porto Rico, St. Thomas, St. Jean, St. Croix, Antigoa.*

baculum Latr. Hist. nat. Crust. et Ins. XII, 104, *Antilles.*

bispinosum Fabr. Suppl. Entom. Syst. 188, *America.*—Serv. Ann. Sc. Nat. XXII, 58, *Amérique.*

buprestoides Stoll', Répr. des Spectr. Spectres, 68, pl. xxiii, fig. 87, *Nouvelle Georgie ou l'Amérique septentrionale.*—[Anisomorpha] De Haan, Bijdr. Kenn. Orthopt. 101, *Caroline, Virginië, Georgië.*

calamus Fabr. Suppl. Entom. Syst. 187, *Insula St. Croix.*—Licht. Trans. Linn. Soc. Lond. VI, 10, *In Insula St. Croix.*—[Bacteria] De Haan, Bijdr. Kenn. Orthopt. 102, *Porto Rico, St. Thomas, St. Jean, St. Croix, Antigoa.*

calcaratum [Bacteria] De Haan, Bijdr. Kenn. Orthopt. 101, 134, *Mexico.*

citrifolium Licht. Trans. Linn. Soc. Lond. VI, 17, *In Indiis* (See Charp. Germ. Zeitsch. f. Entom. V, 289).

cornutum Guild. Trans. Linn. Soc. Lond. XIV, 137, tab. vii, figs. 1–10, *In Americæ mediæ insularumque oppositarum dumetis.*—Serv. Ferr. Bull. Sc. nat. I, 1824, 296, *Amérique équinoxiale.*—Oken, Isis, 1829, 1212, *In Americæ mediæ insularumque oppositarum dumetis.*—Perty, De Ins. in Del. Anim. Art. 19, *In Americæ mediæ, insularumque objacentium dumetis.* — Westw. Introd. Class. Ins. I, 434, *West Indies.*—[Acanthoderus] De Haan, Bijdr. Kenn. Orthopt. 102, *Porto Rico, St. Thomas, St. Jean, St. Croix, Antigoa.*

cubaense [Bacteria] De Haan, Bijdr. Kenn. Orthopt. 101, *Cuba.*

dracunculus Licht. Trans. Linn. Soc. Lond. VI, 16, *In Indiis* (see Charp. Germ. Zeitsch. f. Entom. V, 287).

femoratum [Bacteria] De Haan, Bijdr. Kenn. Orthopt. 101, 134, *Pennsylvanië, Tennessee, Zuid-Caroline.*

ferrugineum Pal. de Beauv. Insectes, 166, pl. xiv, figs. 6, 7, *États unis d'Amérique, Caroline du Sud, Virginie.*—[Anisomorpha] De Haan, Bijdr. Kenn. Orthopt. 101, *Caroline, Virginië, Georgië.*

ferula Fabr. Suppl. Entom. Syst. 187, *Guadeloupe.*

filiforme Fabr. Suppl. Entom. Syst. 186, *America meridionalis.*—Billb. Enum. Ins. 63, *Amer.*—Oken. Allg. Naturg. V, C, 1507, *In Westindien.*

gigas [Diapherodes] Westw. Drury, Ins. II, 100, pl. 1, *St. Vincent.*

havaniense Westw. Catal. Orthopt. 34, pl. xxii, fig. 7, *In Insula Havannah.*

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jamaicense FABR. Suppl. Entom. Syst. 188, *Jamaica.*—STOLL', Répr. des Spectr. Spectres, 15, 17, pl. vi, figs. 20, 21, *Isles Moluques, Ternate, Amboine et Banda; à la côte de Guinée en Afrique et dans l'Amérique espagnole.*—[Platycrana] WESTW. Drury, Ins. II, 99, pl. xlix, fig. 1, *Jamaica.*

laterale LICHT. Trans. Linn. Soc. Lond. VI, 15, *In Indiis* (See Charp. Germ. Zeitsch. f. Entom. V, 286).

lineare [Bacteria] DE HAAN, Bijdr. Kenn. Orthopt. 102, *Porto Rico, St. Thomas, St. Jean, St. Croix, Antigoa.*

mexicanum [Bacteria] DE HAAN, Bijdr. Kenn. Orthopt. 101, *Mexico.*

micropterum [Haplopus] DE HAAN, Bijdr. Kenn. Orthopt. 102, 128, *Porto Rico, St. Thomas, St. Jean, St. Croix, Antigoa.*

Ohrtmanni LICHT. Trans. Linn. Soc. Lond. VI, 17, tab. ii, fig. 1, *In Indiis.*

planulum WESTW. Catal. Orthopt. 34, pl. i, fig. 7, *St. Domingo.*

reticulatum STOLL', Répr. de Spectr. Spectres, 67, pl. xxiii, fig. 85, *Spectre americain.*—PAL. DE BEAUV. Insectes, 166, pl. xiv, fig. 5, *Saint Domingue.*

spinicolle BURM. Handb. d. Entom. II, 585, *St. Domingo bei Port au Prince.*—DE HAAN, Bijdr. Kenn. Orthopt. 101, *St. Domingo.* —GUÉR. Sagra, Hist. nat. de Cuba, 352, *Cuba.*

spinipes [Haplopus] DE HAAN, Bijdr. Kenn. Orthopt. 102, *St. Domingo.*

spinosum FABR. Suppl. Entom. Syst. 188, *In Indiis.*—SERV. Ann. Sc. Nat. XXII, 58, *Des Indes.*—[Bacteria] DE HAAN, Bijdr. Kenn. Orthopt. 102, 134, *St. Domingo.*

striatum [Bacteria] DE HAAN, Bijdr. Kenn. Orthopt. 101, *Mexico.*

tridens [Bacteria] DE HAAN, Bijdr. Kenn. Orthopt. 101, 134, *Mexico.*

venustulum [Diapherodes] DE HAAN, Bijdr. Kenn. Orthopt. 101, 109, *Cuba.*

Phibalosoma.

ploiaria WESTW. Catal. Orthopt. 79, pl. xiii, fig. 4, *In plagis occidentalis Americæ septentrionalis.*

Philobora.

conspersa BRUNN. Blatt. 295, tab. vii, fig. 35, *Cuba, Brésil.*

Phoraspis.

atomaria BLANCH. Ann. Soc. Entom. France, [1] VI, 287, pl. x, fig. 2, *Guadeloupe.*—SERV. Orthopt. 126, *Guadeloupe.*—SAUSS. Orthopt. Amér. moy. 144, *Guadaloupe.*—BRUNN. Blatt. 159, *Guadeloupe, Brésil.*

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mexicana Sauss. Orthopt. nov. amer. III, 11;—Ib. Rev. et Mag. de Zool. 1862, 228, *Mexico.*—Ib. Orthopt. Amér. moy. 143, *Mexique.*—Brunn. Blatt. 159, *Mexique.*

pantherina Blanch. Ann. Soc. Entom. France, [1] VI, 292, pl. x, fig. 3, *St. Domingo.*—Serv. Orthopt. 127, *Saint Domingue.*—Sauss. Orthopt. Amér. moy. 144, *Guadeloupe.*—Brunn. Blatt. 160, *Saint Domingue.*

Phortiœca, see Zetobora.
Photina, see Mantis.

Phyllodromia.

adspersicollis Brunn. Blatt. 107, *Mexique, Rio Janeiro.*

bivittata Brunn. Blatt. 92, *Cap de Bonne Espérance, Ile de France, Cuba, Pérou, Brésil.* See also *Blatta bivittata.*

borealis Brunn. Blatt. 101, *Amérique du Nord.*

Burmeisteri Gerst. Archiv f. Nat. XXIV, II, 348;—Ib. Bericht, 1857, 156, *Cuba.* See also *Blatta Burmeisteri.*

cubensis Brunn. Blatt. 109, *Cuba.* See also *Blatta cubensis.*

delicatula Gerst. Archiv f. Nat. XXIV, II, 348;—Ib. Bericht, 1857, 156, *Cuba.* See also *Blatta delicatula.*

germanica Brunn. Blatt. 90, tab. ii, fig. 7, *Nouvelle Hollande, Rambodde sur l'ile de Ceylon, nord de l'Afrique, Guinée supérieure, Martinique, Chile, Amérique du Nord, l'Europe, Kirguises, Sibérie, Sicile, Algérie.*

punctulata Brunn. Blatt. 108, *St. Domingue.*

totonaca Brunn. Blatt. 94, *Mexique.*

vitrea Brunn. Blatt. 109, tab. ii, fig. 8, *Veracruz, Iles de Fidji.* See also Blatta.

Phyllopalpus.

pulchellus Uhler, Proc. Entom. Soc. Philad. II, 544, *Maryland, New York.*—Dallas, Zool. Record. I, 573, *Maryland, N. York.*

Phylloptera.

azteca Sauss. Orthopt. nov. amer. I, 7;—Ib. Rev. et Mag. de Zool. 1859, 203, *Cordova, Mexiko.*—Gerst. Archiv f. Nat. XXVI, II, 405;—Ib. Bericht, 1859-60, 49, *Mexiko.*

caudata Scudd. Bost. Journ. Nat. Hist. VII, 445, *Texas.*

couloniana Sauss. Orthopt. nov. amer. II, 4;—Ib. Rev. et Mag. de Zool. 1861, 128, *Cuba.*—Gerst. Archiv f. Nat. XXVIII, II, 316;—Ib. Bericht, 1861, 44, *Cuba.*

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curvicauda HARR. Treat. Ed. 1841–2, 129; Ed. 1852, 140; Ed. 1862, 161, *Middle and Southern States.*

huasteca [Orophus] SAUSS. Orthopt. nov. amer. I, 8;—IB. Rev. et Mag. de Zool. 1859, 205, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexiko.*

laurifolia SERV. Orthopt. 404, *Martinique, Cap de Bonne Espérance?* —MACQ. Catal. Mus. Lille, 328, *Martinica.*— GUÉR. Sagra, Hist. nat. de Cuba, 354, *Surinam, Brésil, Martinique, Cuba.* See also *Locusta laurifolia.*

legumen [Lobophyllus] SAUSS. Orthopt. nov. amer. I, 8;—IB. Rev. et Mag. de Zool. 1859, 205, *America.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *America.*

mexicana [Orophus] SAUSS. Orthopt. nov. amer. I, 7;—IB. Rev. et Mag. de Zool. 1859, 204, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexiko.*

myrtifolia SERV. Ann. Sc. Nat. XXII, 142, *Amérique.*—? GOSSE, Can. Nat. 278, *Canada.*

oblongifolia BURM. Handb. d. Entom. II, 693, *Nordamerika.*—HARR. Treat. Ed. 1841–2, 128; Ed. 1852, 139; Ed. 1862, 159, fig. 75, *Mass. Penn.*—EMM. Agric. of N. Y. V, 145, *New York.*—JAEG. N. Amer. Ins. 1854, 154; 1859, 109, *N. America.*—SCUDD. Bost. Journ. Nat. Hist. VII, 444, *Mass.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 445, *Illinois.* See also *Locusta oblongifolia.*

otomaria [Orophus] SAUSS. Orthopt. nov. amer. I, 7;—IB. Rev. et Mag. de Zool. 1859, 204, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexiko.*

pisifolia [Diplophyllus] SAUSS. Orthopt. nov. amer. I, 6;—IB. Rev. et Mag. de Zool. 1859, 202, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexiko.*

retinervis BURM. Handb. d. Entom. II, 692, *Nordamerika.* See also *Locusta retinervis.*

rhombifolia [Orophus] SAUSS. Orthopt. nov. amer. I, 8;—Rev. et Mag. de Zool. 1859, 204, *Carolina.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Carolina.*

rotundifolia SCUDD. Bost. Journ. Nat. Hist. VII, 445, *Mass. Vermont, Conn. Rhode Island, Illinois.*

salicifolia [Orophus] SAUSS. Orthopt. nov. amer. I, 7;—IB. Rev. et Mag. de Zool. 1859, 204, *Carolina.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Carolina.*

tarasca SAUSS. Orthopt. nov. amer. I, 7;—IB. Rev. et Mag. de Zool. 1859, 203, *Mechoacan, Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexiko.*

tessellata [Orophus] SAUSS. Orthopt. nov. amer. II, 4;—IB. Rev. et Mag. de Zool. 1861, 129, *Mexico.*—[Orophus] GERST. Archiv f. Nat. XXVIII, II, 316;—IB. Bericht, 1861, 44, *Mexiko.*

tolteca SAUSS. Orthopt. nov. amer. I, 7;—IB. Rev. et Mag. de Zool.

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1859, 203, *Mexico.*—Gerst. Archiv f. Nat. XXVI, II, 405;—Ib. Bericht, 1859–60, 49, *Mexiko.*

totonaca [Orophus] Sauss. Orthopt. nov. amer. I, 8;—Ib. Rev. et Mag. de Zool. 1859, 204, *Mexico.*—Gerst. Archiv f. Nat. XXVI, II, 405;—Ib. Bericht, 1859–60, 49, *Mexiko.*

zendala [Petaloptera] Sauss. Orthopt. nov. amer. I, 9;—Ib. Rev. et Mag. de Zool. 1859, 205, *Mexico.*—Gerst. Archiv f. Nat. XXVI, II, 405;—Ib. Bericht, 1859–60, 49, *Mexiko.*

See also Locusta.

Phylloscirtus.

elegans Guér. Iconogr. Règne Anim. Ins. 333, *Mexique.*—Erichs. Archiv f. Nat. XIII, II, 138;—Ib. Bericht, 1846, 74, *Mexico.*—Gerst. Entom. Zeit. Stett. XXIV, 427, *Columbien, Mexico.*

Phymateus.

miliaris Serv. Ann. Sc. Nat. XXII, 278, *Amérique méridionale?*

Planes, see Epilampra.

Platamodes.

pennsylvanica Scudd. Bost. Journ. Nat. Hist. VII, 417, *Indiana, Maryland.*

unicolor Scudd. Bost. Journ. Nat. Hist. VII, 417, *Massachusetts.*—Gerst. Archiv f. Nat. XXIX, II, 355;—Ib. Bericht, 1862, 41, *Massachusetts.*

Platycrana.

jamaicensis Gray, Synops. Phasm. 38, *In India occidentali.* See also *Phasma jamaicensis.*

Stollii Burm. Handb. d. Entom. II, 582, *Amerika.*

venustula Burm. Germ. Zeitsch. f. Entom. II, 38, *Cuba.*—Serv. Orthopt. 242, *Cuba.*—Guér. Sagra, Hist. nat. de Cuba, 351, *Cuba.*

viridana Serv. Orthopt. 241, *Amérique?*

See also Phasma.

Platydactylus.

Saulcyi Guér. Iconogr. Règne Anim. Ins. 330, *Martinique.*—Erichs. Archiv f. Nat. XIII, II, 139;—Ib. Bericht, 1846, 75, *Martinique.*—Guér. Sagra, Hist. nat. de Cuba, 354, *Guadeloupe.*

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surinamensis SERV. Orthopt. 365, pl. ix, fig. 1, *Amérique méridionale, Brésil.*—BLANCH. Hist. nat. Ins. III, 32, *Amérique méridionale.* See also GRYLLUS.

Platyphyllum.

concavum HARR. Treat. Ed. 1841–2, 128; Ed. 1852, 139; Ed. 1862, 158, fig. 74, *Mass. Penn.*—ERICHS. Archiv f. Nat. IX, II, 227;—IB. Bericht, 1842, 83, *Mass.*—FITCH, Amer. Journ. Agric. and Sc. VI, 146, *New York.*—EMM. Agric. of N. Y. V, 144, pl. ix, fig. 8, *New York.*—JAEG. N. Amer. Ins. 1854, 150, tab. v, figs. 23–25; 1859, 105, fig. 23 (on p. 106), 24 (on p. 107), *America.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 445, *Illinois.*

coriaceum SERV. Orthopt. 446, *Martinique.*—BLANCH. Hist. nat. Ins. III, 22, *Martinique.*

perspicillatum SERV. Orthopt. 445, *Mexique.*—UHLER, Harr. Treat. Ed. 1862, 158, *N. England.*

Zimmermanni SAUSS. Orthopt. nov. amer. I, 9;—IB. Rev. et Mag. de Zool. 1859, 206, *Carolina meridionalis.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Süd Carolina.*

Platyphyma.

aztecum SAUSS. Orthopt. nov. amer. II, 12;—IB. Rev. et Mag. de Zool. 1861, 161, *Mexico temperata.*—GERST. Archiv f. Nat. XXVIII, II, 317;—IB. Bericht, 1861, 45, *Mexiko.*

mexicanum BRUNN. Orthopt. Stud. 4;—IB. Verhandl. zool. bot. Gesellsch. Wien, 1861, 224, *Au pied de la niège sur le volcan d'Orizaba, Mexico.*—GERST. Archiv f. Nat. XXVIII, II, 319;—IB. Bericht, 1861, 47, *Orizaba.*

PLATYZOSTERIA, see POLYZOSTERIA.

Plectoptera.

Poeyi SAUSS. Orthopt. Amér. moy. 177, *Cuba.*

porcellana SAUSS. Orthopt. Amér. moy. 176, figs. on pp. 155–157, 164, 175, *Cuba.*

PODISMA, see ACRIDIUM.

Pœpedetes.

corallinus SAUSS. Orthopt. nov. amer. II, 8;—IB. Rev. et Mag. de Zool. 1861, 158, *Mexico temperata.*—GERST. Archiv f. Nat.

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XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Aus dem gemässigten Mexiko.*

Polyancistrus.

serrulatus Serv. Ann. Sc. Nat. XXII, 154;—Ib. Orthopt. 535, *St. Domingue.*—Blanch. Hist. nat. Ins. III, 22, *St. Domingue.*—Charp. Orthopt. descr. tab. l, *St. Domingo.*—Erichs. Archiv f. Nat. X, II, 298;—Ib. Bericht, 1843, 50, *St. Domingo.*—Ib. Archiv f. Nat. XIII, II, 139;—Ib. Bericht, 1846, 75, *Haiti.*—Guér. Sagra, Hist. nat. de Cuba, 355, *Cuba, St. Domingue.* See also *Locusta serrulata.*

See also Locusta.

Polyphaga.

mexicana [Homœogamia] Sauss. Orthopt. Amér. moy. 226, pl. ii, figs. 36, 37, *Mexique; terres chaudes de la Cordillière orientale, Orizaba.*

See also Blatta.

Polyzosteria.

azteca Sauss. Orthopt. nov. amer. III, 2;—Ib. Rev. et Mag. de Zool. 1862, 163, *Mexico alta.*—Ib. Orthopt. Amér. moy. 55, *Les terres froides du Mexique, le plâteau.*—Gerst. Archiv f. Nat. XXIX, II, 354;—Ib. Bericht, 1862, 40, *Hoch Mexiko.*

mexicana Sauss. Orthopt. nov. amer. III, 1;—Ib. Rev. et Mag. de Zool. 1862, 163, *Mexico alta.*—Ib. Orthopt. Amér. moy. 54, *Les terres froides du Mexique, le plâteau.*—Gerst. Archiv f. Nat. XXIX, II, 354;—Ib. Bericht, 1862, 40, *Hoch Mexiko.*—[Platyzosteria] Brunn. Blatt. 216, *Haut Mexique.*

opaca [Platyzosteria] Brunn. Blatt. 216, *Ile de Cuba.*

orientalis Sauss. Orthopt. Amér. moy. 54, *Originaire de l'hemisphère oriental s'est répandue dans l'Amérique au Brésil.*

rufovittata [Platyzosteria] Brunn. Blatt. 215, *Oaxaca, Mexique.*

Prisopus.

berosus Westw. Catal. Orthopt. 168, pl. xx, fig. 7, *Litt. occid. Americæ septentrionalis, Panama.*

mexicanus Sauss. Orthopt. nov. amer. I, 4;—Ib. Rev. et Mag. de Zool. 1859, 63, *Mexico.*—Gerst. Archiv f. Nat. XXVI, II, 404;—Ib. Bericht, 1859–60, 48, *Mexiko.*

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Proscratea.

conspersa [Tribonium] Sauss. Orthopt. nov. amer. III, 15;—Ib. Rev. et Mag. de Zool. 1862, 232, *Cuba.*—[Tribónium] Orthopt. Amér. moy. 208, *Cuba; probablement importée du Brésil.*

Psalidophora.

bipunctata Dohrn, Entom. Zeit. Stett. XXV, 419, *Mass.*

brunneipennis Serv. Orthopt. 30, *Amérique boréale, Philadelphie.*—Burm. Germ. Zeitsch. f. Entom. II, 80, *Nord-Amerika.*—Dohrn, Entom. Zeit. Stett. XXV, 418, *In America boreali, Pennsylvania, Virginia.*

parallela Dohrn, Entom. Zeit. Stett. XXIII, 227, taf. 1, fig. 3, *Cordova.*—Ib. Entom. Zeit. Stett. XXV, 418, *Mexiko?* — Gerst. Archiv f. Nat. XXIX, II, 359;—Ib. Bericht, 1862, 45, *Mexiko.*

Lherminieri Serv. Orthopt. 29, *Guadeloupe, Brésil.*

Psalis.

americana Serv. Ann. Sc. Nat. XXII, 35, *Saint Domingue.*

Pterinoxylus.

difformipes Serv. Orthopt. 227, *Amérique méridionale.* — Westw. Catal. Orthopt. 90, pl. xxxvi, fig. 1, *America meridionalis.*

Pterophyllum.

concavum Harr. Encycl. Amer. VIII, 42, *America.*—Gosse, Alab. 182, *Alabama.* See also *Gryllus concavus.*

See also Gryllus.

Pycnoscelus.

obscurus Scudd. Bost. Journ. Nat. Hist. VII, 422, *Mass.* — Gerst. Archiv f. Nat. XXIX, II, 356;—Ib. Bericht, 1862, 42, *Massachusetts.*

Pygidicrana.

Saussurei Dohrn, Entom. Zeit. Stett. XXIII, 225, taf. 1, fig. 2, *Cordova, Veracruz.*—Ib. Entom. Zeit. Stett. 1863, 63, *Mexico?*—Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Mexiko.*

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Pygirhynchus.

coronatus Serv. Orthopt. 261, *Probablement de l'Amérique méridionale.*—Westw. Catal. Orthopt. 58, *America meridionalis.*

Rhammatocerus, see Stenobothrus.

Rhaphidophora.

Agassizii Scudd. Gen. Rhaph. 6; — Ib. Proc. Bost. Soc. Nat. Hist. VIII, 11, *Islands in Gulf of Georgia, Washington Territory.*— Gerst. Archiv f. Nat. XXVIII, II, 316; — Ib. Bericht, 1861, 44, *Inseln im Golf von Georgia.*

cavernarum Sauss. Ann. Soc. Entom. France, [iv] I, 492, *La grotte du Mammouth, aux États unis.* — Gerst. Archiv f. Nat. XXVIII, II, 315;—Ib. Bericht, 1861, 43, *Mammuth-Höhle.*

gracilipes Scudd. Gen. Rhaph. 2;—Ib. Proc. Bost. Soc. Nat. Hist. VIII, 7, *Pennsylvania.*

lapidicola Scudd. Gen. Rhaph. 2;—Ib. Proc. Bost. Soc. Nat. Hist. VIII, 7, *United States.* See also *Locusta lapidicola.*

maculata Harr. Treat. Ed. 1841–2, 126, *Mass.* — Erichs. Archiv f. Nat. IX, II, 227; — Ib. Bericht, 1842, 83, *Mass.* — Fitch, Amer. Journ. Agric. and Sc. VI, 146, *N. York.*—Pack. Rep. Nat. Hist. Maine, 1861, 375, *Grand Falls, Maine.* — Thomas, Trans. Ill. St. Agric. Soc. V, 444, *Illinois.*

scabripes Scudd. Gen. Rhaph. 2; — Ib. Proc. Bost. Soc. Nat. Hist. VIII, 7, *Alabama.*

stygia Scudd. Gen. Rhaph. 4;—Ib. Proc. Bost. Soc. Nat. Hist. VIII, 9, *Hickman's Cave, Kentucky.*—Gerst. Archiv f. Nat. XXVIII, II, 316;—Ib. Bericht, 1861, 44, *Höhle in Kentucky.*

subterranea Scudd. Gen. Rhaph. 3;—Ib. Proc. Bost. Soc. Nat. Hist. VIII, 8, *Mammoth Cave, Kentucky.* — Gerst. Archiv f. Nat. XXVIII, II, 316;—Ib. Bericht, 1861, 44, *Mammuth-Höhle.*

xanthostoma Scudd. Gen. Rhaph. 7;—Ib. Proc. Bost. Soc. Nat. Hist. VIII, 12, *Crescent City, California.*—Gerst. Archiv f. Nat. XXVIII, II, 316;—Ib. Bericht, 1861, 44, *Küste des Stillen Oceans.*

See also Locusta.

Rhipipteryx.

mexicanus Sauss. Orthopt. nov. amer. I, 15;—Ib. Rev. et Mag. de Zool. 1859, 316, *Mexico calida.*—Gerst. Archiv f, Nat. XXVI, II, 404;—Ib. Bericht, 1859–60, 48, *Mexico.*

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Rhombea.

cicada FELT. Phil. Trans. LIV, 55, pl. vi, *Jamaica.*—WESTW. Mag. Nat. Hist. [n. s.] III, 490, fig. 67[1] (on p. 492), *Jamaica.*

Romalea.

centurio BURM. Handb. d. Entom. II, 620, *Georgien.*—SAUSS. Rev. et Mag. de Zool. 1859, 392, *Mexico calida.* See also *Acridium centurio.*

eques BURM. Handb. d. Entom. II, 620, *Aus Mexico von Zimapan.*—SAUSS. Rev. et Mag. de Zool. 1859, 392, *Mexico calida.*

gigantea BURM. Handb. d. Entom. II, 619, *Südkarolina.* See also *Acridium giganteum.*

Marci SERV. Orthopt. 623, *D'une partie de l'Amérique voisine de la Caroline du Sud.*

microptera SERV. Ann. Sc. Nat. XXII, 280, *Amérique septentrionale.*—OKEN, Isis, 1835, 176, *N. America.*—SERV. Orthopt. 622, *Amérique septentrionale, Caroline.*—CHARP. Orthopt. descr. tab. xlix, *América media et septentrionalis.*—ERICHS. Archiv f. Nat. X, II, 299;—IB. Bericht, 1843, 51, *Nordamerika.*

miles GERST. Handb. d. Zool. II, 55, *Von Brasilien bis Mexico.*

pedes GERST. Archiv f. Nat. XXVI, II, 407;—IB. Bericht, 1859–60, 51, *Mexico.*—SAUSS. Rev. et Mag. de Zool. 1859, 392, *Mexico calida.*

See also ACRIDIUM and DICTYOPHORUS.

RUTIODERES, see LOCUSTA.

Schœnobates.

mexicanus SAUSS. Orthopt. nov. amer. I, 12;—IB. Rev. et Mag. de Zool. 1859, 209, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexiko.*

Spectrum.

baculus LAM. Hist. nat. Anim. sans Vert. IV, 255; 2[e] Ed. IV, 456; 3[e] Ed. II, 157, *Antilles.*

bivittatum SAY, Amer. Entom. III. pl. xxxviii;—IB. Entom. of N. Amer. Ed. LeConte, I, 82, pl. xxxviii, *Cumberland Island, Florida.*

calamus LAM. Hist. nat. Anim. sans Vert. IV, 255; 2[e] Ed. IV, 456; 3[e] Ed. II, 156, *L'Isle de Saint Croix d'Amérique.*

femoratum SAY, Exp. Long. II, 297;—IB. Entom. of N. Amer. Ed.

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LeConte, I, 197, *Falls of Niagara, Missouri River.*—Ib. Amer. Entom. III, pl. xxxvii;—Ib. Entom. of N. Amer. Ed. Leconte, I, 83, pl. xxxvii, *Niagara, Missouri, N. Jersey, Mass.*—Harr. Hitchc. Rep. 582; 2d Ed. 576;—Ib. Catal. 56, *Mass.*—Leidy, Proc. Acad. Nat. Sc. Philad. III, 80, *In most parts of the United States; abundant in Iowa.*—Erichs. Archiv f. Nat. XIII, II, 138;—Ib. Bericht, 1846, 74.—Hald. Amer. Journ. Sc. [ii] V, 435, *Chihuahua, Santa Fé.*—Emm. Agric. of N. Y. V, 142, pl. vii, figs. 1, 2, *Albany, Western Massachusetts.*—Jaeg. N. Amer. Ins. 1854, 173; 1859, 123, *N. America.*—Thomas, Trans. Ill. St. Agric. Soc. V, 441, *Illinois.*

ferula Lam. Hist. nat. Anim. sans Vert. IV, 255; 2e Ed. IV, 455; 3e Ed. II, 156, *Guadeloupe.*

filiforme Lam. Hist. nat. Anim. sans Vert. IV, 255; 2e Ed. IV, 455; 3e Ed. II, 156, *Amérique méridionale.*

vittatum Jaeg. N. Amer. Ins. 1854, 173; 1859, 123, *N. America.*

Sphenarium.

mexicanum Sauss. Rev. et Mag. de Zool. 1859, 390, *Mexico calida.*—Gerst. Archiv f. Nat. XXVI, II, 407;—Ib. Bericht, 1859-60, 51, *Mexiko.*

purpurascens Charp. Orthopt. descr. tab. xxxi, *Mexico.*—Erichs. Archiv f. Nat. IX, II, 228;—Ib. Bericht, 1842, 84, *Mexico.*

Sphingonotus, see Œdipoda.

Spongophora.

bipunctata Scudd. Bost. Journ. Nat. Hist. VII, 415, *Mass.*—Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Massachusetts.*

Steirodon.

thoracicum Serv. Ann. Sc. Nat. XXII, 141;—Ib. Orthopt. 402, *Amérique méridionale.*

Stenobothrus.

admirabilis Uhler, Proc. Entom. Soc. Philad. II, 553, *Maryland.*—Dallas, Zool. Record, I, 574, *Baltimore.*

æqualis Scudd. Bost. Journ. Nat. Hist. VII, 459, *Mass. Maine, New York, Minnesota.*—Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Massachusetts und Connecticut.*

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bilineatus Scudd. Bost. Journ. Nat. Hist. VII, 460, *Mass.*—Gerst. Archiv f. Nat. XXIX, II, 358; — Ib. Bericht, 1862, 44, *Massachusetts und Connecticut.*

curtipennis Scudd. Can. Nat. VII, 286, *Red River Settlements.*—Ib. Bost. Journ. Nat. Hist. VII, 456, *Mass. Maine, Conn. Red River Settlements.*—Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Massachusetts und Connecticut.*

gregarius [Rhammatocerus] Sauss. Orthopt. nov. amer. II, 20;—Ib. Rev. et Mag. de Zool. 1861, 318, *St. Thomas, Haiti.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *St. Thomas und Taiti (sic!).*

longipennis Scudd. Bost. Journ. Nat. Hist. VII, 457, *Mass.*—Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Massachusetts und Connecticut.*

maculipennis Scudd. Bost. Journ. Nat. Hist. VII, 458, *Mass.*—Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Massachusetts und Connecticut.*

melanopleurus Scudd. Bost. Journ. Nat. Hist. VII, 456, *Mass. Maine.*—Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Massachusetts und Connecticut.*

mystecus [Rhammatocerus] Sauss. Orthopt. nov. amer. II, 19;—In. Rev. et Mag. de Zool. 1861, 317, *Mexico.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

occidentalis [Rhammatocerus] Sauss. Orthopt. nov. amer. II, 19;—Ib. Rev. et Mag. de Zool. 1861, 317, *Tennessee.*— Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Tennessee.*

propinquans Scudd. Bost. Journ. Nat. Hist. VII, 46, *Conn. Minnesota.*—Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Massachusetts und Connecticut.*

speciosus Scudd. Bost. Journ. Nat. Hist. VII, 458, *Minnesota.*—Gerst. Archiv f. Nat. XXIX, II, 358; — Ib. Bericht, 1862, 44, *Massachusetts und Connecticut.*

tepanecus [Rhammatocerus] Sauss. Orthopt. nov. amer. II, 21;—In. Rev. et Mag. de Zool. 1861, 319, *Mexico.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexico.*

viatorius [Rhammatocerus] Sauss. Orthopt. nov. amer. II, 20;—Ib. Rev. et Mag. de Zool. 1861, 317, *In tota Mexico.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

Stenopelmatus.

fuscus Hald. Stansb. Expl. Utah, 372, *Santa Fé, Chihuahua.* — Schaum, Archiv f. Nat. XIX, II, 270;—Ib. Bericht, 1852, 130, *Utah.*

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histrio SAUSS. Orthopt. nov. amer. I, 14;—IB. Rev. et Mag. de Zool. 1859, 210, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexiko.*

mexicanus SAUSS. Orthopt. nov. amer. I, 13;—IB. Rev. et Mag. de Zool. 1859, 210, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexiko.*

minor SAUSS. Orthopt. nov. amer. I, 13;—IB. Rev. et Mag. de Zool. 1859, 210, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexiko.*

Nieti SAUSS. Orthopt. nov. amer. I, 13;—IB. Rev. et Mag. de Zool. 1859, 210, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexiko.*

Sallei SAUSS. Orthopt. nov. amer. I, 13;—IB. Rev. et Mag. de Zool. 1859, 210, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexiko.*

Sartorianus SAUSS. Orthopt. nov. amer. I, 14;—IB. Rev. et Mag. de Zool. 1859, 211, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexiko.*

Sumichrasti SAUSS. Orthopt. nov. amer. I, 13;—IB. Rev. et Mag. de Zool. 1859, 210, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexiko.*

talpa BURM. Handb. d. Entom. II, 721, *Von Zimapan in Mexiko.*—HALD. Stansb. Expl. Utah, 372, *Jalapa.*

STIGMATOPTERA, see MANTIS.

Stylopyga.

orientalis SCUDD. Bost. Journ. Nat. Hist. VII, 416, *Mass. New York, Maryland.* See also *Periplaneta orientalis.*

See also PERIPLANETA.

Temnopteryx.

deropeltiformis BRUNN. Blatt. 87, *Amérique du Nord.*

tarasca BRUNN. Blatt. 86, *Mexico.*

virginica BRUNN. Blatt. 86, *Draper's Valley en Virginie.*

Teratodes.

monticollis SERV. Orthopt. 634, *Des Indes.*—BLANCH. Hist. nat. Ins. III, 41, *Amérique méridionale.*

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Tettigidea.

lateralis SCUDD. Bost. Journ. Nat. Hist. VII, 477, *Mass. Maine, New Hampshire, Connecticut, Southern Illinois.*

polymorpha SCUDD. Bost. Journ. Nat. Hist. VII, 477, *Mass. Maine, New Hampshire, Missouri, Conn. Southern Illinois, Alabama.*

TETTIGONIA, see GRYLLUS.

Tettix.

arenosa BURM. Handb. d. Entom. II, 659, *Südkarolina.* See also *Acridium arenosum.*

azteca SAUSS. Orthopt. nov. amer. II, 31;—IB. Rev. et Mag. de Zool. 1861, 400, *Mexico calida.*—GERST. Archiv f. Nat. XXVIII, II, 317;—IB. Bericht, 1861, 45, *Mexiko.*

bilineata HARR. Treat. Ed. 1841-2, 151; Ed. 1852, 162; Ed. 1862, 186, *Mass.*—ERICHS. Archiv f. Nat. IX, II, 231;—IB. Bericht, 1842, 87, *Mass.*

chichimeca SAUSS. Orthopt. nov. amer. II, 31;—IB. Rev. et Mag. de Zool. 1861, 400, *Mexico calida.* — GERST. Archiv f. Nat. XXVIII, II, 317;—IB. Bericht, 1861, 45, *Mexiko.*

cristata PACK. Rep. Nat. Hist. Maine, 1861, 375, *Grand Falls, Maine.*

cucullata BURM. Handb. d. Entom. II, 658, *Südkarolina.*—SCUDD. Bost. Journ. Nat. Hist. VII, 475, *Mass. Missouri.* See also *Acridium cucullatum.*

dorsalis HARR. Treat. Ed. 1841-2, 151; Ed. 1852, 162; Ed. 1862, 186, *Mass.*—ERICHS. Archiv f. Nat. IX, II, 231;—IB. Bericht, 1842, 87, *Mass.*—FITCH, Amer. Journ. Agric. and Sc. VI, 146, *New York.*

granulata SCUDD. Can. Nat. VII, 288, *Northern Minnesota.*—IB. Bost. Journ. Nat. Hist. VII, 474, *Mass. Maine, N. Hampshire, Minnesota.* See also *Acridium granulatum.*

Harrisii PACK. Rep. Nat. Hist. Maine, 1861, 376, *Fish River Lakes, Maine.*

lateralis HARR. Hitchc. Rep. 583; 2d Ed. 577;—IB. Catal. 57;—IB. Treat. Ed. 1841-2, 151; Ed. 1852, 163; Ed. 1862, 187, *Mass.*—ERICHS. Archiv f. Nat. IX, II, 231;—IB. Bericht, 1842, 87, *Mass.*

mexicana SAUSS. Orthopt. nov. amer. II, 30;—IB. Rev. et Mag. de Zool. 1861, 399, *Mexico calida.* — GERST. Archiv f. Nat. XXVIII, II, 317;—IB. Bericht, 1861, 45, *Mexiko.*

ornata HARR. Hitchc. Rep. 2d Ed. 577;—IB. Catal. 57;—IB. Treat. Ed. 1841-2, 150; Ed. 1852, 162; Ed. 1862, 186, *Mass.*—ERICHS. Archiv f. Nat. IX, II, 231;—IB. Bericht, 1842, 87, *Mass.*—FITCH, Amer. Journ. Agric. and Sc. VI, 146, *New*

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York.—Scudd. Bost. Journ. Nat. Hist. VII, 474, *Mass. Maine, N. Hampshire, Vermont, Conn. Missouri, Southern Illinois.*

oxycephala Burm. Handb. d. Entom. II, 659, *Südkarolina.* See also *Acridium oxycephalum.*

parvipennis Harr. Hitchc. Rep. 583; 2d Ed. 577;—Ib. Catal. 57;—Ib. Treat. Ed. 1841–2, 152; Ed. 1852, 163; Ed. 1862, 187, fig. 82, *Mass.*—Erichs. Archiv f. Nat. IX, II, 231;—Ib. Bericht, 1842, 87, *Mass.*

polymorpha Burm. Handb. d. Entom. II, 659, *Südkarolina.* See also *Acridium polymorphum.*

purpurascens Serv. Ann. Sc. Nat. XXII, 291, *Ile de la Trinité.*

quadrimaculata Harr. Treat. Ed. 1841–2, 151; Ed. 1852, 162; Ed. 1862, 186, *Mass.*—Erichs. Archiv f. Nat. IX, II, 231;—Ib. Bericht, 1842, 87, *Mass.*

rugosa Scudd. Bost. Journ. Nat. Hist. VII, 476, *Northern Florida.*—Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Florida.*

sordida Harr. Hitchc. Rep. 2d Ed. 577;—Ib. Catal. 57;—Ib. Treat. 1841–2, 151; Ed. 1852, 162; Ed. 1862, 187, *Mass.*—Erichs. Archiv f. Nat. IX, II, 231;—Ib. Bericht, 1842, 87, *Mass.*

tolteca Sauss. Orthopt. nov. amer. II, 31;—Ib. Rev. et Mag. de Zool. 1861, 401, *Mexico calida.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

triangularis Scudd. Bost. Journ. Nat. Hist. VII, 475, *Mass. Maine, N. Hampshire.*—Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Massachusetts.*

See also Acridium.

Theoclytes.

azteca Sauss. Orthopt. nov. amer. I, 2;—Ib. Rev. et Mag. de Zool. 1859, 61, *Mexico.*—Gerst. Archiv f. Nat. XXVI, II, 402;—Bericht, 1859–60, 46, *Mexiko.*

chlorophæa ? Serv. Orthopt. 153, *New York.*

mexicana Sauss. Orthopt. nov. amer. II, 2;—Ib. Rev. et Mag. de Zool. 1861, 127, *Cordova, Mexico calida.*—Gerst. Archiv f. Nat. XXVIII, II, 311;—Ib. Bericht, 1861, 39, *Mexiko.*

tolteca Sauss. Orthopt. nov. amer. I, 2;—Ib. Rev. et Mag. de Zool. 1859, 61, *Mexico.*—Gerst. Archiv f. Nat. XXVI, II, 402;—Ib. Bericht, 1859–60, 46, *Mexiko.*

Thermastris.

Saussurei Dohrn, Entom. Zeit. Stett. XXIV, 63, *Cordova, Veracruz.*

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Thespis.

parva SERV. Ann. Sc. Nat. XXII, 55, *Amérique.* See also *Mantis parva.*

See also MANTIS.

Thyreonotus.

dorsalis SCUDD. Bost. Journ. Nat. Hist. VII, 454, *Mass. Rhode Island, Maryland.*

pachymerus SCUDD. Bost. Journ. Nat. Hist. VII, 453, *Connecticut, Mammoth Cave, Kentucky.*

Thyrsocera.

cincta BURM. Handb. d. Entom. II, 499, *Mexiko.*—SAUSS. Orthopt. Amér. moy. 125, *Mexico.*—BRUNN. Blatt. 122, *Mexique.*

discicollis ? BRUNN. Blatt. 123, *Mexique.*

Gueriniana SAUSS. Orthopt. nov. amer. III, 7; IB. Rev. et Mag. de Zool. 1862, 168, *Mexico.*—IB. Orthopt. Amér. moy. 124, *Mexique.*—GERST. Archiv f. Nat. XXIX, II, 354;—IB. Bericht, 1862, 40, *Mexiko.*—BRUNN. Blatt. 126, *Mexique.*

mexicana SAUSS. Orthopt. nov. amer. III, 6;—IB. Rev. et Mag. de Zool. 1862, 168, *Mexico calida.*—IB. Orthopt. Amér. moy. 122, *Les parties chaudes du Mexique, Cordova, Tuxtla, Alvarado.*—GERST. Archiv f. Nat. XXIX, II, 354;—IB. Bericht, 1862, 40, *Mexiko.*

oblongata BRUNN. Blatt. 121, tab. iii, fig. 11, *Surinam, Bahia, Oaxaca.*

Sallei SAUSS. Orthopt. nov. amer. III, 7;—IB. Rev. et Mag. de Zool. 1862, 168, *Mexico calida.*—IB. Orthopt. Amér. moy. 123, *Les parties chaudes du Mexique; de la côte du golfe.*—GERST. Archiv f. Nat. XXIX, II, 354;—IB. Bericht, 1862, 40, *Mexiko.*

tolteca SAUSS. Orthopt. nov. amer. III, 7;—IB. Rev. et Mag. de Zool. 1862, 168, *Mexico calida.*—IB. Orthopt. Amér. moy. 124, pl. i, fig. 21, *Les régions chaudes du Mexique; de Cordova et de la Cordillière orientale; dans les terres chaudes de la province de Mexico à Atlihuayan près Cuautla.*—GERST. Archiv f. Nat. XXIX, II, 354;—IB. Bericht, 1862, 40, *Mexiko.*—BRUNN. Blatt. 125, *Mexique.*

Tomonotus.

mexicanus SAUSS. Orthopt. nov. amer. II, 23;—IB. Rev. et Mag. de Zool. 1861, 321, *Mexico temperata.*—GERST. Archiv f. Nat. XXVIII, II, 317;—IB. Bericht, 1861, 45, *Mexiko.*

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Nietanus Sauss. Orthopt. nov. amer. II, 24;—Ib. Rev. et Mag. de Zool. 1861, 321, *Mexico.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

otomitus Sauss. Orthopt. nov. amer. II, 24;—Ib. Rev. et Mag. de Zool. 1861, 322, *Mexico orientalis.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

Zimmermanni Sauss. Orthopt. nov. amer. I, 23;—Ib. Rev. et Mag. de Zool. 1861, 320, *Carolina.*—Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Carolina.*

Tragocephala.

infuscata Erichs. Archiv f. Nat. IX, II, 230;—Ib. Bericht, 1842, 86, *Mass.*—Scudd. Bost. Journ. Nat. Hist. VII, 461, *Mass. Maine, N. Hampshire, Connecticut.*—Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Nord Amerika.* See also *Locusta infuscata.*

radiata Erichs. Archiv f. Nat. IX, II, 230;—Ib. Bericht, 1842, 86, *Mass.* See also *Locusta radiata.*

viridifasciata Erichs. Archiv f. Nat. IX, II, 230;—Ib. Bericht, 1842, 86, *Mass.*—Scudd. Bost. Journ. Nat. Hist. VII, 461, *Mass. Maine, Maryland, Conn.*—Gerst. Archiv f. Nat. XXIX, II, 358;—Ib. Bericht, 1862, 44, *Nord Amerika.* See also *Locusta viridifasciata.*

See also Locusta.

Tridactylus.

apicalis Say, Journ. Acad. Nat. Sc. Philad. IV, 310;—Ib. Entom. of N. Amer. Ed. LeConte, II, 239, *Southern and Western States.*—Burm. Handb. d. Entom. II, 742, *Südkarolina.*—Scudd. Bost. Journ. Nat. Hist. VII, 425, *Alabama, Kentucky.*—Thomas, Trans. Ill. St. Agric. Soc. V, 441, *Illinois.*

illinoiensis Thomas, Proc. Entom. Soc. Philad. I, 104;—Ib. Trans. Ill. St. Agric. Soc. V, 441, *Illinois.*

minutus Scudd. Bost. Journ. Nat. Hist. VII, 425, *Southern Illinois.*—Gerst. Archiv f. Nat. XXIX, II, 356;—Ib. Bericht, 1862, 42, *Illinois.*

terminalis Scudd. Bost. Journ. Nat. Hist. VII, 426, *Mass. Maryland, S. Illinois.*—Gerst. Archiv f. Nat. XXIX, II, 356;—Ib. Bericht, 1862, 42, *Massachusetts.*

tibialis Guér. Iconogr. Règne Anim. Ins. 336, *Nouvelle Orléans.*—Erichs. Archiv f. Nat. XIII, II, 139;—Ib. Bericht, 1846, 75, *New Orleans.*

Tribonium, see Proscratea.

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Tropidischia.

xanthostoma Scudd. Bost. Journ. Nat. Hist. VII, 441, *Crescent City, California.*

Tropinotus.

serratus Fisch. Index Orthopt. 16;—Ib. Bull. Soc. Imp. Nat. Mosc. XIX, II, 481, *Am. mer.*

Truxalis.

brevicornis Fabr. Syst. Entom. 279, *America.*—Ib. Spec. Ins. I, 352, *In America meridionali.*—Ib. Entom. Syst. II, 28;—Ib. Nom. Entom. emend. Ed. 1797, 80; Ed. 1810, 80, *America.*—Billb. Enum. Ins. 64, *Amer.*—Thunb. Mém. Acad. St. Peterbs. V, 264, *In India orientali et occidentali.*—Ib. Nov. Act. Upsal. IX, 84, *In India occidentali, America meridionali et Africa.*—Burm. Handb. d. Entom. II, 607, *Karolina, Brasilien.* See also *Gryllus brevicornis.*

cristatus Macq. Catal. Mus. Lille, 329, *America meridionalis.*

dorsalis Farg. Ferr. Bull. Sc. Nat. XVII, 143, *Amérique méridionale, Brésil.*

giganteus Herbst, Fuessly, Archiv d. Ins. 1786, 191, tab. lii, fig. 6, *Amerika.* See also *Gryllus giganteus.*

nasutus Thunb. Mém. Acad. St. Petersb. V, 264, *In India orientali, Africa, Australi, China, Barthelemi.*—Ib. Nov. Act. Upsal. IX, 85, *In India orientali, Capite bonæ spei, insula Barthelemei et in China.*

notoclorus Pal. de Beauv. Insectes, 80, pl. iii, fig. 3, *Saint Domingue.*

obscurus Farg. Ferr. Bull. Sc. Nat. XVII, 143, *Amérique méridionale, Brésil.*

Sumichrasti [Achurum] Sauss. Orthopt. nov. amer. II, 15;—Ib. Rev. et Mag. de Zool. 1861, 313, *Mexico temperata.*—[Achurum] Gerst. Archiv f. Nat. XXVIII, II, 317;—Ib. Bericht, 1861, 45, *Mexiko.*

viridulus Pal. de Beauv. Insectes, 81, pl. iii, fig. 4, *Saint Domingue.*

See also Gryllus.

Udeopsylla.

nigra Scudd. Can. Nat. VII, 284;—Ib. Bost. Journ. Nat. Hist. VII, 443, *Minnesota, Red River of the North.*—Gerst. Archiv f. Nat. XXIX, II, 357;—Ib. Bericht, 1862, 43, *Red River.*

robusta Scudd. Bost. Journ. Nat. Hist. VII, 442, *Nebraska.*

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Xiphicera.

emarginata SERV. Orthopt. 612, *Brésil, Amérique septentrionale.*

pygmæa SAUSS. Orthopt. nov. amer. II, 6;—IB. Rev. et Mag. de Zool. 1861, 156, *Mexico.*—GERST. Archiv f. Nat. XXVIII, II, 316;—IB. Bericht, 1861, 44, *Mexiko.*

serripes LAM. Hist. nat. Anim. sans Vert. IV, 244; 2e Ed. IV, 445; 3e Ed. II, 153, *Les Indes.*

Xiphidium.

agile BURM. Handb. d. Entom. II, 707, *Süd-Karolina.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 445, *Illinois.* See also *Locusta agilis.*

brevipenne SCUDD. Can. Nat. VII, 285, *Red River Settlements, British America.*—IB. Bost. Journ. Nat. Hist. VII, 451, *Mass. Cape Cod, Maine.*—GERST. Archiv f. Nat. XXIX, II, 357;—IB. Bericht, 1862, 43, *Massachusetts.*

ensiferum SCUDD. Bost. Journ. Nat. Hist. VII, 451, *Illinois.*—GERST. Archiv f. Nat. XXIX, II, 357;—IB. Bericht, 1862, 43, *Illinois.*

fasciatum SERV. Ann. Sc. Nat. XXII, 159, *Pennsylvanie.*—BURM. Handb. d. Entom. II, 708, *Mittel Amerika.*—? SCUDD. Can. Nat. VII, 285, *Red River Settlements, British America.*—IB. Bost. Journ. Nat. Hist. VII, 451, *Mass. Cape Cod, Maine, Rhode Island, Conn. Vermont.*—THOMAS, Trans. Ill. St. Agric. Soc. V, 444, *Illinois.*

glaberrimum BURM. Handb. d. Entom. II, 707, *Süd-Karolina.* See also *Locusta glaberrima.*

mexicanum SAUSS. Orthopt. nov. amer. I, 11;—IB. Rev. et Mag. de Zool. 1859, 208, *Mexico.*—GERST. Archiv f. Nat. XXVI, II, 405;—IB. Bericht, 1859–60, 49, *Mexiko.*

See also LOCUSTA.

Xya.

apicalis UHLER, Say, Entom. of N. Amer. Ed. LeConte, II, 239, *Southern and Western States.*

mixta HALD. Proc. Acad. Nat. Sc. Philad. VI, 364, *Fort Gates, Western Texas.*—GERST. Archiv f. Nat. XX, II, 245;—IB. Bericht, 1853, 59, *Texas.*

Xylodus.

adumbratus SAUSS. Orthopt. nov. amer. I, 4;—IB. Rev. et Mag. de Zool. 1859, 62, *Portorico.*

See also ACANTHODERUS.

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Zetobora.

cicatricosa [Phorticæa] Sauss. Orthopt. Amér. moy. 213, *Cuba*.—Brunn. Blatt. 291, *Para, Havane*. See also *Blatta cicatricosa*.

fissicollis Brunn. Blatt. 292, *Cayenne, Ile de Cuba*.

verrucosa Sauss. Blatt. nov. 26;—Ib. Rev. et Mag. de Zool. 1864, 344;—[Phorticæa] Ib. Orthopt. Amér. moy. 215, *Amérique méridionale*.

See also Blatta.

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TABULAR ARRANGEMENT OF THE GENERA.

[It should be stated regarding certain names of genera mentioned below (e. g., Gryllus, Locusta, Acrida, Tettigonia, Achurum and Bulla), that they are either not now used by Orthopterologists, or having been employed by various authors for very different insects, have created great confusion. I have placed them where it seemed most proper.]

GRYLLIDES.

GRYLLINA.
- Phalangopsis.
- Myrmecophila.
- Œcanthus.
- Orocharis.
- Hapithus.
- Phyllopalpus.
- Paroccanthus.
- Phylloscirtus.
- Paragryllus.
- Eneoptera.

GRYLLINA (cont.).
- Platydactylus.
- Nemobius.
- Gryllus.
- Acheta.

GRYLLOTALPINA.
- Gryllotalpa.
- Xya.
- Tridactylus.
- Rhipipteryx.

LOCUSTARIÆ.

(Tettigonia.)

BRADYPORIDÆ.
- Bradyporus.
- Hetrodes.
- Anabrus.
- Cyphoderris.

MECONEMIDÆ.

PHANEROPTERIDÆ.
- Phaneroptera.
- Phylloptera.
- Diplophyllus.
- Lobophyllus.
- Orophus.

PHANEROPTERIDÆ (cont.).
- Microcentrum.
- Steirodon.

PSEUDOPHYLLIDÆ.
- Cyrtophyllus.
- Pterophyllus.
- Platyphyllus.
- Acanthodis.
- Calamoptera.
- Meroncidium.
- Platyphyllum.
- Polyancistrus.

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LOCUSTARIÆ (cont.).

CONOCEPHALIDÆ.
- Copiophora.
- Conocephalus.

LOCUSTIDÆ.
- Xiphidium.
- Orchelimum.
- Decticus.
- Thyreonotus.
- Orchesticus.
- Locusta.
- Gryllacris.

STENOPELMATIDÆ.
- Stenopelmatus.
- Anostostoma.
- Gnathoclita.
- Daihinia.
- Udeopsylla.
- Schœnobates.
- Rhaphidophora.
- Ceuthophilus.
- Hadenœcus.
- Camptonotus.
- Tropidischia.

ACRYDII.

PROSCOPIDÆ.

TRUXALIDÆ.
- Acrida.
- Achurum.
- Opsomala.
- Ichthydion.
- Oxyphyma.

CONOPHORI.
- XIPHOCERIDÆ.
  - Xiphocera.
  - Machærocera.
  - Tropidonotus.
  - Romalea.
  - Dictyopherus.
  - Rutioderes.
- PŒCILOCERIDÆ.
  - *Pamphagidæ.*
    - Pamphagus.
    - Dactylotum.
    - Epphippigera.
  - *Phymatidæ.*
    - Phymateus.

MUCRONATI.
- Teratodes.
- Monachidium.
- Ommatolampis.
- Pedies.
- Pœpedetes.
- Acrydium.
- Oxya.

MUCRONATI (cont.).
- Podisma.
- Caloptenus.
- Pezotettix.
- Platyphyma.
- Arcyptera.

MUTICI.
- Brachypeplus.
- Sphenarium.
- Œdipoda.
- Hippiscus.
- Leprus.
- Sphingonotus.
- Tomonotus.
- Tragocephala.
- Chloealtis.
- Pegasidion.
- Gomphocerus.
- Rhammatocerus.
- Stenobothrus.
- Hippopedon.
- Oxycoryphus.

TETRICIDES.
- Chloriphyllum.
- Hymenotes.
- Rhombea.
- Tettix.
- Tettigidea.
- Batrachidea.
- Bulla.

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PHASMIDA.

BACILLIDÆ.
- Bacteria.
- Bacunculus.
- Acanthoderus.
- Xylodus.
- Anisomorpha.
- Pygirhynchus.
- Diapheromera.
- Spectrum.

CLADOXERIDÆ.
- Phibalosoma.
- Anophlelepis.

PHASMIDÆ.
- Diapherodes.
- Haplopus.
- Pterinoxylus.
- Creoxylus.
- Cyphocrania.
- Platycrania.
- Metriotes.
- Phasma.
- Necroscia.

PHYLLIDÆ.
- Prisopus.

MANTIDES.

I. BREVICOLLIA.
- Eremophila.
- Oxypilus.

II.—A.

a. MANTIDÆ.
- Mantis.
- Photina.
- Thespis.
- Chœradodis.
- Epaphrodita.
- Stigmatoptera.
- Cardioptera.

MANTIDÆ (cont.).
- Acontistes.
- Theoclytes.

b. EMPUSIDÆ.
- Empusa.
- Idolomorpha.

B.

a. HARPAGIDÆ.
- Harpax.

b. ACANTHOPSIDÆ.
- Acanthops.

BLATTARIÆ.

ECTOBIDÆ.
- Ectobia.
- Anaplecta.
- Plectoptera.
- Hololampra.

PHYLLODROMIDÆ.
- Ceratinoptera.
- Temnopteryx.
- Phyllodromia.
- Thyrsocera.
- Ischnoptera.
- Platamodes.
- Nyctobora.

EPILAMPRIDÆ.
- Paratropa.
- Phoraspis.
- Epilampra.
- Planes.

PERIPLANETIDÆ.
- Polyzosteria.
- Platyzosteria.
- Stylopyga.
- Periplaneta.
- Cacerlaca.
- Kakkerlac.
- Blatta.

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BLATTARIÆ (cont.).

CHORISONEURIDÆ.
- Chorisoneura.

PANCHLORIDÆ.
- Panchlora.
- Leucophœa.
- Pycnoscelus.
- Nauphoeta.
- Zetobora.
- Phortiœca.
- Philobora.

PERISPHERIDÆ.
- Proscratea.
- Tribonium.

CORYDIDÆ.
- Corydia.
- Holocompsa.

HETEROGAMIDÆ.
- Heterogamia.
- Polyphaga.
- Homœogamia.

BLABERIDÆ.
- Monachoda.
- Monastria.
- Petasodes.
- Blabera.

PANESTHIDÆ.
- Dasyposoma.
- Cryptocercus.

FORFICULARIÆ.

- Pygidicrana.
- Thermastris.
- Labidura.
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- Forcinella.
- Brachylabis.
- Psalidophora.
- Spongophora.
- Labia.
- Ancistrogaster.
- Forficula.
- Apterygida.

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SMITHSONIAN MISCELLANEOUS COLLECTIONS.

194

LAND AND FRESH WATER SHELLS

OF

NORTH AMERICA.

PART I.

PULMONATA GEOPHILA.

BY

W. G. BINNEY AND T. BLAND.

WASHINGTON:
SMITHSONIAN INSTITUTION.
FEBRUARY, 1869.

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PREFACE.

At the request of the Smithsonian Institution I have prepared the following Manual of the Land-Shells of North America, based on the "Monograph of the Terrestrial Air-Breathing Mollusks of the United States." I have copied the descriptions and figures of the species described in the four volumes of that work, enlarging the synonymy and adding to the notes of geographical distribution. The more recently discovered species are also described, the whole subject being brought down to January, 1868.

The geographical limits of my work include all of North America from the extreme north to the Rio Grande and to Mazatlan.

In the preparation of the work I have been greatly aided by my friend Mr. Thomas Bland, of New York. The elimination of some of the most difficult groups is to be accredited solely to him. He has, indeed, been so thoroughly identified with the work that I have obtained permission to use his name on the title-page, thus giving additional authority to the work.

Most of the figures have been drawn by Mr. E. S. Morse, of Salem, Mass.

W. G. BINNEY.

Burlington, N. J., February, 1869.

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LAND AND FRESH-WATER SHELLS

OF

NORTH AMERICA.

I.

ORDER PULMONATA.

LINGUAL membrane short and broad; teeth numerous, uniform, in numerous transverse rows. Mouth usually with horny jaws. Respiratory organ in the form of a closed chamber lined with pulmonic vessels on the back of the animal and covered by the shell; edge of the mantle attached—the entrance to the air-chamber being through an opening in the side, closed by a valve. Operculum almost universally absent. Animal hermaphrodite, with reciprocal impregnation, generally oviparous, terrestrial, fluviatile or marine, but respiring free air. Tentacles and eye-peduncles retractile or contractile.

Shell varied in form, sometimes rudimentary or wanting.

Eyes at the end of elongated peduncles, or on the head of the animal.

The Pulmonata are usually divided into three suborders—*Geophila*, *Limnophila*,[1] and *Thalassophila*[2]—names derived respectively from the terrestrial, fluviatile, and marine habits of the animals.

SUBORDER GEOPHILA.

Eyes at the tips of elongated, cylindrical peduncles; tentacles retractile or contractile, cylindrical, shorter than, and placed under, the eye-peduncles, sometimes very small or wanting.

[1] See Land and Fresh-water Shells, II, p. 1.

[2] Ib. p. 152.

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Operculum never present in the adult. Animal usually terrestrial.

I have adopted the systematic classification of the *Geophila* proposed by Dr. J. E. Gray, which seems to express more satisfactorily than that of others, their natural systematic arrangement. Its general characters are as follows:—

A. *Head, eye-peduncle, and tentacles retractile under the skin.*

Sect. 1. VERMIVORA. Buccal mass very large, elongate, projectile like a proboscis. Jaw none; teeth numerous, slender, conical, distant. Mantle well defined. Subterraneous; carnivorous, or worm-eating.

Sect. 2. PHYLLOVORA. The buccal mass small, ovoid, not produced. Jaw distinct, horny;[1] teeth numerous, four-sided, close together on the lingual membrane. Herbivorous.

B. *Head, eye-peduncle, and tentacles simple, contractile.*

I use these subdivisions because I believe they exist in nature, and with the same understanding do I use the divisions of families and genera. The subgenera which I adopt in the following pages I consider merely artificial divisions, used for convenience in dealing with genera abounding in numerous species.

It will be seen that I have usually adopted for the larger divisions the descriptions given by H. & A. Adams—for genera and subgenera those of Albers and Martens. From the last named I have also usually adopted the subgeneric names, without inquiry into their precedence, having neither time nor inclination to attempt myself to disentangle the confused synonymy.

In the synonymy of the species I have quoted only authors giving a description or figure. I have personally consulted all the references, unless otherwise specified.

The subject is brought down to January, 1868.

HABITS, &c.—They live mostly in the forest, sheltered under the trunks of fallen trees, layers of decaying leaves, stones, or in the soil itself. In these situations they pass the greater part of their lives. In the early days of spring, they sometimes assemble in considerable numbers, in warm and sunny situations, where they pass hours in indolent enjoyment of the warmth and ani-

[1] Except in *Cylindrella*.

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mating influence of the sunshine. Whether these meetings serve any useful purpose in the economy of the animal, or are caused by the pleasurable sensation, and renewed strength derived from the warmth of the situation after the debility of their winter's torpidity, is uncertain; it is probable, however, that they precede the business of procreation. It is certain that they last but a short time, and that after early spring, the animals are to be found in their usual retreats.

In the course of the months of May or June, earlier or later, according to the locality and as the season is more or less warm, they begin to lay their eggs. These are deposited, to the number of from thirty to fifty and even more, in the moist and light mould, sheltered from the sun's rays by leaves, or at the side of logs and stones, without any order, and slightly agglutinated together. The depth of the deposit is usually measured by the extreme length of the animal, which thrusts its head and body into the soil to the utmost extent, while the shell remains at the surface; but sometimes the animal burrows three or four inches deep before making the deposit, in order to insure a sufficiently moist position. Three or four such deposits, and sometimes more, are made by one animal during the summer and autumn. When the deposit is complete it is abandoned by the animal. The eggs vary in size according to the magnitude of the species producing them. They are nearly globular, one axis being somewhat longer than the other, white and opaque. They consist, in general, of an external, semi-calcareous, elastic membrane investing the whole, the interior surface of which is usually studded with numerous rhombic, microscopic crystals of carbonate of lime, some species however having a hard enveloping calcareous shell, of the consistence of that of a bird's egg; of an inner thin, transparent, shining membrane which immediately incloses a transparent and somewhat viscid fluid, analogous to the albumen of bird's eggs; of the albumen itself, and of the vitellus, which, possessing the same degree of transparency as the albumen, cannot be distinguished from it at this time. The elastic eggs when first laid are often flaccid, and seemingly only half full of fluid, but they soon absorb moisture and become distended. The embryo animal, with its shell, is observable in the albuminous fluid in a few days after the egg is laid. Its exclusion takes place, under ordinary circumstances, in from twenty to thirty

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days, according to the state of the atmosphere. Warmth and humidity hasten the process, while cold and dryness retard it to an almost indefinite extent. The hatching of eggs laid late in the autumn is often interrupted by the approach of cold weather and of snow, and delayed until the next spring.

The young animal gnaws its way out of the egg, and makes its first repast of the shell which it has just left. It consists at first of about one and a half whirls, the umbilicus being minute, but open. Its growth is rapid, and it has usually increased in magnitude three or four times, before the close of the first year.

In the month of October, or at the epoch of the first frost, the snail ceases to feed, becomes inactive, and fixes itself to the under surface of the substance by which it is sheltered, or partially burrows in the soil, and with the aperture of the shell upward, disposes itself for its annual sleep or *hybernation*. Withdrawing into the shell, it forms over the aperture a membranous covering, consisting of a thin, semi-transparent mixture of lime mucus or gelatine, secreted from the collar of the animal. This membrane is called the *epiphragm*. It is formed in this manner: The animal being withdrawn into the shell, the collar is brought to a level with the aperture, and a quantity of mucus is poured out from it and covers it. A small quantity of air is then emitted from the respiratory foramen, which detaches the mucus from the surface of the collar, and projects it in a convex form, like a bubble. At the same moment, the animal retreats farther into the shell, leaving a vacuum between itself and the membrane, which is consequently pressed back by the external air to a level with the aperture, or even farther, so as to form a concave surface, where, having become desiccated and hard, it remains fixed. These operations are nearly simultaneous, and occupy but an instant. As the weather becomes colder the animal retires farther into the shell, and makes another septum, and so on, until there are sometimes as many as six of these partitions. The circulation becomes slow, the pulsations of the heart, which in the season of activity vary from forty to sixty in a minute, according to the temperature of the air, decrease in frequency and strength, until they at length become imperceptible. The other functions of the body cease, and a state of torpidity succeeds, which is interrupted only by the reviving heat of the

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next spring's sun. During the months[1] of April or May, on the accession of the first warm weather of the season, the animal breaks down and devours the membranous partitions, and comes forth to participate in the warmth and freshness of the season. At first it is weak and inactive, but recovering in a short time its appetite, resumes its former activity.

The season of hybernation continues from four to six months. The final cause of this extraordinary condition is undoubtedly to enable the animal to resist successfully the extreme reduction of temperature, and to survive through the long period when it must, in northern climates at least, be entirely destitute of its usual food. With a view to the first purpose, a place of shelter is provided, and the aperture of the shell is hermetically sealed by the epiphragm or the hibernaculum; for the second, the state of torpor is adopted, during which the functions of digestion, respiration, and circulation being suspended, and all the secretions and excretions having ceased, there is no drain upon the strength and vitality of the animal, and no exhaustion of its forces. Hence it comes forth, at the end of the period, in much the same condition in which it commenced it, and resumes almost immediately its usual functions and habits. So entire is the cessation of the function of respiration, that the air contained between the epiphragm and the animal is found to be unchanged. The circulation, however, may be partially restored by a small degree of heat, the warmth of the hand being sufficient to stimulate the heart to action.

The snails pass the greater part of their lives under dead leaves and logs, under stones, or burrowing in the ground. They seldom come from their lurking places while the sun shines, and indeed are never seen ranging in the daytime unless the day be damp and dark. Should they then be surprised by the appearance of the sun, they immediately take shelter from its rays, under some cover or on the shaded side of the trunks of trees.

Their natural food is vegetable; and the formation of the mouth and the organs with which it is armed seems to be peculiarly well adapted for cutting fruits and the succulent leaves of plants. The dental edge of the upper jaw being applied against the substance to be eaten, the semilunar rough instrument, which

[1] In New England, earlier in more southern latitudes.

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Spallanzani calls the *tongue*, is brought up against it, cutting out and carrying into the mouth semicircular portions of nutriment. This operation is carried on with great rapidity, and the substance to be eaten soon disappears. It is certain, however, that some species[1] are also fond of animal food, and sometimes prey upon earth-worms, their own eggs, and even upon each other; but the slowness of their motions and their consequent inability to pursue prey forbids the idea of their being dependent on animal food. They, in their turn, become the prey of various birds and reptiles; and it is no uncommon thing to observe, in the forest, clusters of broken shells lying on logs or stones which have been chosen by birds as convenient places for breaking the shell and extracting the animal.

The snails of the United States are for the most part solitary in their habits, differing very much, in this respect, from the snails of Europe. It is true that in localities favorable for their residence they may be collected in considerable numbers; and especially is this the case in the States north of the Ohio River. But even there, they seem to live independently of each other, and not to unite into herds or communities. There are occasional exceptions, however, as in the case of *Helix alternata*, very large numbers of which have been observed collected into a small space, especially in winter, as if for the purpose of imparting warmth to each other. The few species of European snails which have been introduced retain their native habits. *Helix hortensis*, for instance, which has been transplanted to some of the small islands in the vicinity of Cape Ann, is found there in countless numbers, literally covering the soil and shrubs. It is worthy of notice also, that each island is inhabited by a variety peculiar to itself, showing that the variety which happened to be introduced there has propagated itself, without a tendency to run into other variations. Thus, on one islet we have the yellowish-green, unicolored variety, once described as *Helix subglobosa;* and on another, within a very short distance, we find a banded variety, and none others.

In regard to colors, our snails are quite plain and exceedingly uniform; in this respect, also, differing essentially from the species of the old world. They vary from yellowish-green through horn-

[1] These are characterized by the lingual dentition: see *Vermivora*.

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color to chestnut, most of them being simply horn-colored. This is perhaps owing to the fact that our species do not infest our gardens and open fields, but are generally confined to forests, sheltered under logs and stones, and are rarely seen abroad except during twilight or on damp and dark days; indeed, they almost entirely disappear as the forests are cut down, and seem to flee the approach of man. The European species, on the other hand, follow in the track of cultivation, and are common in gardens and fields, on walls and hedges, and other places exposed to the action of light. With the exception of *Helix alternata* and *H. varians*, *Achatina fasciata*, &c., there is scarcely a species having bands or variegated colors inhabiting eastern North America; and even there these latter species can scarcely be regarded as an exception, as they are only to be found at the southern part of Florida, and are more properly West India shells. In Texas, and beyond the Rocky Mountains in Oregon and California, many of the species have one or more bands.

Another peculiarity of the American snails is the tooth-like appendages with which the aperture of a large proportion of them is armed, and which are characteristic of the group designated by Férussac under the name *Helicodonta*. More than one-half of the whole number, and more than three-fourths of those with reflected lips, are thus provided. In some species these appendages assume the form of folds rather than teeth; and in others we have simple threads or laminæ revolving within the aperture in the course of the spire. They are not formed until the shell has attained its full growth.

The genera not furnished with an external shell were grouped into one family of *Limacidæ* by Binney, who thus describes their habits: They are more especially nocturnal than the other families of the order, and they are so rarely visible in the daytime that thousands may be near without being known. The injury which they commit in kitchen-gardens, for this reason, is often vaguely ascribed to worms or to birds; and no measures are taken against the real culprits. Their habits, in general, coincide with those which have been described as distinguishing the order; and we shall therefore mention here only those which are peculiar to them. They differ from the other families in not possessing the faculty of hibernation, or suspension of their organic functions during the cold season. In temperate latitudes, the snails hiber-

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nate, under all circumstances, on the approach of cold weather; the slugs, on the contrary, having the power of resisting extreme cold, continue in their usual haunts until severe frosts set in, when they retire into the earth and other sheltered retreats. Here they remain in a state of inaction and partial torpidity; the functions of the body, however, still going on, though slowly and with diminished force. A slight increase of heat arouses them and stimulates their organs to renewed action, and they accordingly often come abroad in mild weather, even during the winter. Those which inhabit cellars and other protected situations, are in motion throughout the year; and individuals of all the genera and species which we have kept in confinement have continued active, fed freely, and increased in size as much in the coldest months as in the summer.

All the species which have yet come under our notice possess the power of suspending themselves in the air by a gelatinous thread. This they effect by accumulating a quantity of tenacious mucus at the posterior extremity of the foot, which they attach to the object from which they are to commence their descent; then, loosing their own hold, they hang suspended by this point. Continuing the secretion, their own weight attenuates the mucous attachment, and draws it out into a thread. As this dries and hardens, a fresh supply is afforded, the thread is lengthened, and the animal lets itself down any desirable distance. At this time, also, the margin of the foot pours out mucus freely, and during the whole operation the locomotive disk is in active undulatory motion, in the same manner as when in ordinary progression. It appears in this way to guide and force towards the extremity the mucus which is secreted on its surface, and which, collected at its extreme point, forms the thread. The slug often pauses in its descent, and extends its tentacles and its whole body in various directions, as if seeking some object on which to make a lodgment. The faculty of suspending themselves in this manner indicates that they pass some part of their lives on trees, from which they can thus make a convenient descent to the earth; there are some species, indeed, which are stated to inhabit trees almost exclusively. It may serve also as a means by which they can suddenly escape from the attacks of their enemies, and particularly of birds. It is mostly, however, when they are young, or at least not grown to their full size, that they enjoy this power.

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Those which have attained their extreme dimensions and weight are too heavy to trust themselves to so frail a support. They have no power to elevate themselves again, and in this respect are inferior to the spiders, which can both lower and raise themselves by the aid of the secreted thread. Like the spiders, however, they often remain suspended in mid-air for a time, and it is not unlikely that there is some pleasurable sensation connected with the act, which induces them thus to prolong it. We have seen the descent actually practised by every one of our Atlantic species.

Besides the watery fluid which at all times lubricates the integuments, the animals can, at their will, secrete at any point, or over the whole surface of their bodies, a more viscid and tenacious mucus than is usually exuded. This power is used as a means of defence. Whenever a foreign substance touches them, immediately a quantity of this mucus, of the consistence of milk and nearly of the same color, is poured out and forms a kind of membrane interposed between themselves and the irritating substance. So, also, when they are surrounded by a corrosive gas, or are thrown into water or alcohol, they form over themselves in this way a thick protecting covering, which is undoubtedly a non-conductor of heat and impervious, at least for a time, to liquids. Shielded by this coating, they can live the greater part of a day immersed in water, and for a shorter time in alcohol; and M. Férussac asserts that they have survived for hours in boiling water. They leave a trace of their usual secretion on every object over which they pass, and thus can easily be traced to their retreats. The ordinary secretion is most abundant at their posterior extremity. The secretion of the mucous fluid over their surface is necessary to their existence. Death immediately follows the failure of this power, and is preceded by the drying up of the skin.

All the species are extremely voracious, and devour an incredible quantity of food in a short time. Those found in this country are generally supposed to be vegetable feeders, but nearly all of them subsist occasionally upon dead animal matter, of which they seem to be fond, and when in confinement sometimes attack and devour each other; and the foreign genus, *Testacella*, is known to prey habitually upon earth-worms It is probable, therefore, that in their natural condition, all of them

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at times resort to animal food, and devour earth-worms, insects and their larvæ, and such other animals as, inhabiting the same retreats, are like themselves slow of motion and defenceless. It is certain, however, that the principal food of those species which frequent the neighborhood of houses and gardens, consists of the tender leaves of succulent plants and of ripe fruits. Upon these, in Europe, they perpetrate serious ravages, often destroying in a night the labors and hopes of the gardener, and in some years committing so much injury, and interfering to such a degree with the prosperity of the agriculturist that they are ranked among the scourges of the country. Like caterpillars, locusts, and rats, they are considered to be perpetual enemies, and a war of extermination is carried on against them. To limit the extent of the evil, many remedies have been proposed, and among others the prayers and exorcisms of the church have been claimed, but without any considerable abatement of it. Happily, we are not in this country subject, in the same degree, to the mischief done by these animals, for their excessive increase is kept in check, probably, by the vicissitudes of the climate; but it may be useful to know that a border of ashes, sand, or sawdust, laid around the bed containing the plants it is desired to protect, will prove an impassable barrier to the slugs, so long as these substances remain dry. When the slugs attempt to pass the barrier, they become entangled in the dry ashes or sand, which envelops them entirely. The particles of these adhere to the viscid surface of the animals, who, in vain endeavoring to disengage themselves from them by secreting new mucus, at length become exhausted and die.

Their growth is remarkably rapid. We have known the young to double their size and weight in a week. The earliest hatched young of the season generally attain their full maturity before the end of the first year, although they may afterwards increase somewhat in bulk. Those which leave the egg at a later period, mature during the second year. Individuals kept in confinement and fully fed reach a much greater size than when in their natural condition.

They possess, in a remarkable degree, the power of elongation and contraction of the body. When fully extended it is long, narrow, more or less cylindrical, and generally terminating in a sharp point. The carina of the carinated species disappears.

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The head is protruded far beyond the mouth; the eye-peduncles are long, slender, and graceful. The mouth is changed from an oval to an elongated form, with parallel sides and rounded ends. The glands are lengthened, lose their prominence, and appear nearly smooth. But when alarmed by the touch of a foreign substance, an instant change occurs, and a sudden contraction takes place. The tentacles are retracted and the head is drawn under the mantle. The anterior edge of the mantle is brought to the level of the foot, and its form becomes nearly circular. The body is shortened to one-fourth of its former length, and tumid; the back is rounded and rises high in the centre, and the skin is rough with prominent glandular protuberances. The carina, when it exists, becomes conspicuous. This is the form which they assume in their retreats when they retire to protect themselves from the effects of drought and cold. It differs so much from their form when in motion, that one not well acquainted with them would hardly recognize the same animal in its new shape. It is among the *Limaces*, perhaps, that the change is most striking, and the difference of form between the extremes the greatest.

They commence reproducing their kind as early as the end of the first year, before they have attained their full dimensions, and hence the eggs of the same species often vary considerably in size. These are deposited in a cluster of thirty, or thereabouts, in the soil and in other moist and protected situations; or if the species be one that frequents houses, then in the crevices or corners of the walls or under the decaying planks of cellars. In general form and appearance they resemble the eggs of the shell-bearing genera, but differ from them in several important particulars. The eggs of the snails are all opaque, while those of the slugs are more or less transparent, permitting, in the *Limaces*, a view of the cicatricula, and affording an opportunity of observing its developments. Those of the former are all deposited free, or unconnected, except by a slight agglutination; those of the latter, in some of the species, are connected together by a prolongation of the outer membrane at their longest diameter, thus forming a sort of rosary. The deposits of eggs, when made, are abandoned by the slug, who then removes to some other convenient place. A considerable number of separate deposits are made during the year.

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The slugs, and some species of snails were considered by the Romans to possess medicinal properties, and this belief continued, among the nations of Europe, through the middle ages down to comparatively recent times. There is hardly a disease, internal or external, of man or the domestic animals, in which, according to the statements of authors, they have not proved beneficial; and the relations concerning them are numerous and truly marvellous. The testaceous rudiment of the *Limax* acquired in this respect a pre-eminence above the animal itself, and enjoyed a high rank among the numerous bezoars and amulets which were supposed to protect the body from evil influences, and to impart health and activity to its various functions.[1] The accounts of their virtues, copied from one author to another, on the authority of names, show how easily error is perpetuated, and how difficult it is to eradicate from the public mind a false opinion which has once obtained a footing. A full relation of all the absurdities which gained credence, would form a curious page in the history of credulity and superstition. The more general diffusion of knowledge at the present day has dispelled these ideas in a great degree; but some relics of them still linger among the rural population of many parts of Europe. In this country, no such belief has ever prevailed; and so hidden and clandestine are the habits of the animals, that but a small part of the population is aware of their existence, and those who are familiar with them view them with such feelings of disgust as would effectually prevent their use either as medicine or as food. They have also from very early times been used in the preparation of cosmetics; and the water procured from them by distillation, no longer than two or three centuries ago, was much celebrated and used by ladies, to impart whiteness and freshness to the complexion.

[1] As late as the close of the sixteenth century. Helling published a dissertation with this title: "*Ossiculorum limacum usus in febribus.*" During the year 1863, a syrup of snails was prescribed to members of my family by two regular French physicians in Paris.

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A. *Head, eye-peduncles, and tentacles retractile under the skin.*

Sect. I. VERMIVORA. Buccal mass very large, elongate, projectile like a proboscis. Jaw none; teeth numerous, slender, conical, distant. Mantle well defined. Usually subterraneous; carnivorous, or worm-eating.

FAMILY OLEACINIDÆ.

Lingual membrane long, narrow; teeth uniform, pointed, distant, arranged *en chevron*, recurved, apex directed backwards.

Jaw wanting.

Body very long, attenuated, spiral, protected by a well-developed shell. Head with a retractile, projectile buccal sack. Eyes near the ends of long, cylindrical, retractile peduncles; tentacles moderate, retractile; labial processes developed into curved, flat, triangular feelers. Mantle thin, covered with a shell, capable of containing the whole animal; respiratory orifice on the right side, beneath the margin of the shell. Foot elongate, narrow, without any distinct locomotive disk, simple posteriorly. Vent near the respiratory orifice. Orifice of reproductive organs someways behind the right eye-peduncle.

Shell spiral, oblong, flesh-colored, outer lip thin, acute; aperture long and narrow.

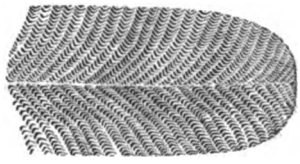
GLANDINA, SCHUM.

Shell oblong, fusiform, horn-colored, whirls 6–8, the last attenuated at base. Aperture narrow, elliptically-oblong; peristome simple; columella twisted forward at the base and truncated. Suture often crenulated or margined. Uniform in color or ornamented with longitudinal, usually brownish streaks.

There is no horny jaw.

Lingual membrane narrow, with chevron-shaped rows of uniform,

Fig. 1.



Lingual membrane of *G. truncata*.

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Fig. 2.

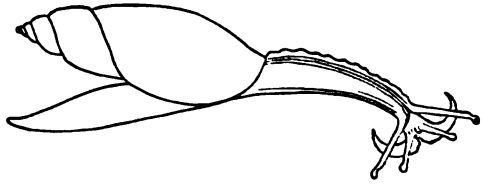
Lingual dentition of *Glandina truncata*.

curved, thorn-like teeth; centrals[1] long, slender, straight, widened at base.

SUBGENUS **GLANDINA**, s. str.

Shell ovate, or ovate-oblong, plicately-striate, generally of a silken lustre, but never glittering, and usually decussated with delicate revolving lines; suture crenulated; aperture equalling about half the shell's length, its peristome simple.

Fig. 3.



Glandina truncata, one-half the natural size.

Body elongated, narrowed anteriorly; eye-peduncles long, having the eye spots on the posterior face, behind the tips, which are deflected; tentacles half the length of the eye-peduncles, bulbous, and somewhat deflected at tip; on each side of the oral aperture is a retractile, palpiform appendage, attenuated at tip, and more or less recurved, nearly as long as the eye-peduncle, the bases separated by a fissure in front; buccal pouch capable of a proboscidiform protrusion, the aperture furnished with three

[1] Albers and Martens describe the lingual membrane as having no central line of teeth, and it is so figured by Leidy in the Terrestrial Mollusks (II, 303). Morse has detected a central line as figured above. In comparing the lingual membrane with that of the *Helicidæ* it may be said that the lateral teeth are entirely omitted, the uncini alone being present: in *Zonites* the uncini are equally prominent, and the laterals very few; in *Macrocyclis*, also, no laterals are present.

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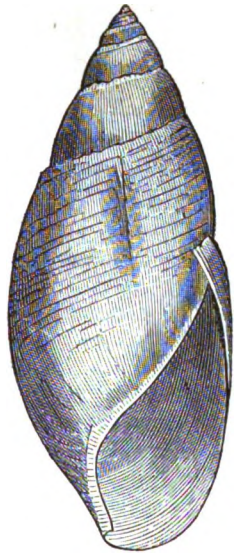
papillæ above and three on each side; lingual organ semioval, armed with oblique ranges of recurved hooks. Genital orifice at some distance behind the right eye-peduncle. Carnivorous, feeding on other snails.

Glandina vanuxemensis, Lea.—Shell elongated, ovate-fusiform, thin and fragile, considerably transparent, pale fawn color, in some specimens inclined to greenish, and generally flecked with distant, pale spots; the surface is, in a measure, coarsely granulated by the decussation of longitudinal and revolving lines, the latter of which are more distant from each other than the former, and become less and less distinct towards the anterior portion of the whirl; whirls seven or eight, the apical ones smooth and forming a mammillary tip; suture crenulated; aperture about one-half the length of the shell, nearly three times as long as broad; columella strongly arched, and scarcely glazed by enamel. Length of axis 68, breadth 25 mill.

Fig. 4.



Glandina vanuxemensis.

Glandina vanuxemensis, Lea, Trans. Am. Philos. Soc. V, 84, pl. xix, f. 78, Obs. I, 196 (1837).—Pfeiffer, Symbolæ, III, 91.—Binney, Terr. Moll. II, 299, pl. lxii, f. 1.—W. G. Binney, T. M. IV, 141.

Glandina vanuxemii, Tryon, Am. Journ. Conch. II, 226, pl. i, f. 6 (1866).

Achatina vanuxemensis, Reeve, Conch. Icon. pl. xiii, f. 48.—Pfeiffer, Monog. Helic. Viv. II, 294.

Oleacina vanuxemensis, Pfeiffer, Brit. Mus. Cat. 36; Mon. Hel. IV, 643.

Texas and Mexico.

Glandina truncata, Gmelin.—Shell strong, ovate-fusiform or ellipsoidal, obtuse at tip, of a pale ashy fawn color, or rather alternately striped with ash color and fawn color, and more or less tinted rose color, the surface shining and delicately fluted with longitudinal, raised, and rounded striæ; whirls six or seven, moderately convex, the last constituting three-fourths the length of the shell, somewhat compressed at the middle, so as to become in a measure cylindrical, narrowing forward and rounded at base; suture strongly marked, delicately crenulate; aperture about one-half the length of the shell, often more, and twice as long as

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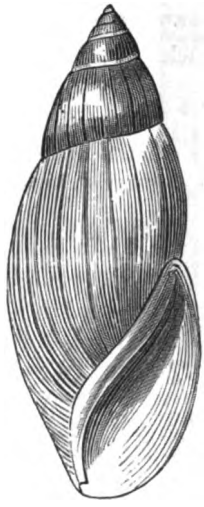
Fig. 5.



Glandina truncata.

broad, narrow, ovate-lunate, acute posteriorly, obtusely rounded anteriorly; lip nearly rectilinear at its middle portion, and springing somewhat forwards; columella arched at its lower portion, and decidedly truncate at tip; throat salmon colored, edge of lip pale. Average length 37 mill., often very much longer; breadth somewhat more than one-third the length.

' *Bulla truncata*, GMELIN, p. 3434.

Buccinum striatum, CHEMNITZ, IX, 36, tab. CXX, f. 1028, 29?

Bulimus striatus, BRUGUIÈRE, Encycl. Meth. I, 366.

Cochlicopa rosea, FERUSSAC, Prodrome, 356; Hist. des Moll. pl. CXXXV, f. 3, pl. CXXXVI, f. 6–10.

Achatina rosea, DESHAYES, Encycl. Meth. II, 10 (1830); ed. LAMARCK, VIII, 313.

Achatina striata, DESHAYES in LAM. ed. 3, III, 381.—CHEMNITZ, ed. 2, tab. iii, f. 3, 4.

Achatina truncata, D'ORBIGNY, Moll. Cub. I, 163, pl. x, f. 13.—REEVE, Conch. Icon. pl. xiii, f. 47.—CHEMNITZ, l. c. (Bul.) tab. XXXVIII, f. 21, 22 (Achatina), No. 78.—PFEIFFER (nec Glandina), Mon. III, 512.

Polyphemus glans, MONTFORT, Conch. II, 415, f. civ (1810).—SAY, Journ. Acad. Nat. Sci. I, 282 (1818); Nich. Enc. ed. 3 (1819); ed. BINNEY, 13, 7.—FERUSSAC, Tabl. Syst. 11.

Glandina truncata, SAY, Amer. Conch. II, pl. XX (1831); ed. BINNEY, p. 34, pl. XX; ed. CHENU (Bib. Conch.), III, 28, pl. vii, f. 2, 2a.—PFEIFFER, Mon. Helic. Viv. II, 286.—DEKAY, N. Y. Moll. 56 (1843).—MRS. GRAY, Fig. Moll. An. pl. cccl, f. 5 (Ex Bost. Journ.)—BINNEY, T. M. II, 301, pl. lix, lx.—W. G. BINNEY, T. M. IV, 141, pl. lxxx, f. 9.—LEIDY, T. M. U. S. I. 258, 259, pl. xiv, xvi (1851), anat.—WYMAN, B. J. N. H. IV, 416, pl. xxiii (1844), anat.—TRYON, Am. Journ. Conch. II, 225, pl. i, f. 2 (1866).

Oleacina truncata, PFEIFFER, Mon. Hel. Viv. IV, 638.—IB. Brit. Mus. Pulmonata, p. 23.

Planorbis glans, DEKAY, l. c. 56.

Atlantic and Gulf States from South Carolina to Texas.

Lingual membrane with 63 long, slender teeth in each chevron-shaped row (32—1—32); centrals straight, pointed, base widened, bifurcated; the other teeth uncinated, thorn-shaped, decreasing in size as they pass off laterally.

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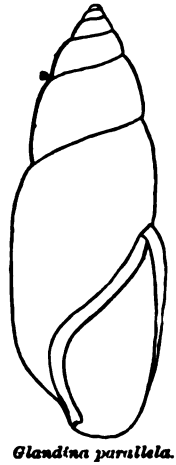
Fig. 6.

Lingual dentition of *Glandina truncata*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8397	1	Texas.	W. G. Binney.	.....
8398	2	Alabama.	.....	.....
8399	1	South Carolina.	.....	.....
8400	1	South Carolina.	Lt. Kurtz.	.....
8401	2	Grand Coteau, La.	St. Charles Coll.	.....
8402	5	Alabama.	.....	.....
8403	1	Florida.	.....	.....
8650	2	St. Simon's Island, Ga.	Dr. J. Lewis.	.....
8650	1	Alabama.	.....	.....
8651		Texas.	Lieut. Couch.	.....
8793	2	Indian Key, Fla.	G. Wurdemann.	.....
8794	2			
8795	1			

Glandina parallela.—Shell heavy, shining, white, elongated, cylindrical; spire elevated, obtuse; whirls six to seven, with numerous, delicate, longitudinal striæ, the upper ones convex, the last one with straight parallel sides; lip straight along the middle, and parallel to the rectilinear side of the opposite whirl, at the basal extremity curved; columella straight, truncated, covered with a heavy callus. Length 56, breadth 20 millimetres.

Fig. 7.



Glandina parallela.

Glandina truncata, var., Binney, T. M. pl. lxii, f. 8.
Glandina parallela, W. G. Binney, Phila. Proc. 1857, 189; T. M. IV, 140.—Tryon, Am. Journ. Conch. II, 226, pl. i, f. 3 (1866).
Oleacina parallela, Pfeiffer, Malak. Blätt. 1859, 51.

From Louisiana through Texas. Probably a variety of *G. truncata*.

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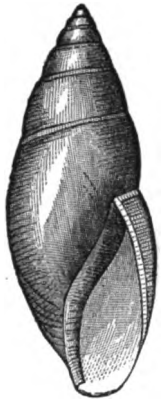
Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8404	3	Texas.	Lieut. Couch.	.....
8649	5	Matamoras.	Lieut. Couch.	.....

Fig. 8.



Glandina decussata.

Glandina decussata, DESHAYES.—Shell oblong-conic, thin, shining, horn-color; whirls seven to eight, longitudinally striate, and covered with numerous minute revolving lines; suture slightly crenulated; aperture oblong, half as long as the shell; columella curved, truncated, covered with light callus. Length 50, diameter 18 millimetres.

Achatina decussata, DESHAYES in FER. (*vide* PFEIFFER, Mon. IV, 644).

Glandina truncata, var., BINNEY, T. M. II, 302, pl. lxi, f. 1.

Glandina corneola, W. G. BINNEY, Proc. Phila. Acad. 1857, 189; T. M. IV, 139.

Glandina decussata, TRYON, Am. Journ. Conch. II, 227, pl. i, f. 7 (1866).

Oleacina corneola, PFEIFFER, Mal. Blatt. 1859, 51.

Western Texas; Mexico.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8738	1	Devil's River, Tex.	Mex. Bound. Surv.	.....

Glandina albersi, PFEIFFER.—Shell ovate-oblong, thin, with crowded longitudinal striæ, pellucid, light flesh-colored; spire moderate, conical, obtuse; suture simple; whirls five and one-half to six, rather convex, more distinctly striated near the suture, the last somewhat longer than the spire, attenuated towards the base; columella straight, abruptly truncated; aperture subvertical, wavy-semioval; peristome simple, acute, its right extremity slightly arcuate. Length 30, breadth 12; of aperture 17 long, 5 mill. broad.

Fig. 9.

Glandina albersi.

Achatina albersi (*Glandina*), PFEIFFER, Proc. Zool. Soc. 1854, 295.

Glandina albersi, CARPENTER, Maz. Cat. 175 (1850).—TRYON, Am. Journ. Conch. II, 227, pl. i, f. 9 (1866).

Oleacina albersi, PFEIFFER, Mon. Hel. IV, 640.

California.

Fig. 9 is drawn from an authentic specimen in Mr. Cuming's collection.

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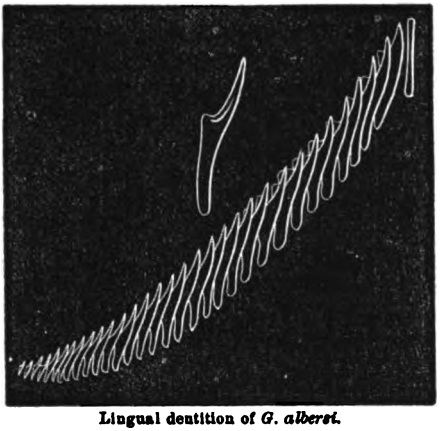
Lingual membrane with 50 chevron-shaped rows of 65 slender teeth (32—1—32); central long, narrow, simple; others uncinated, thorn-shaped, greatly modified in size as they pass off laterally.

Fig. 10.



Lingual dentition of *G. alberti*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9337	4	Colima, Sierra Madre.	Xantus.	.....

Glandina turris, PFEIFFER.—Shell oblong-turreted, closely and lightly costulate-striate, rather thin, diaphanous, flesh-colored; suture margined; whirls seven, very slightly convex, the last less than three-sevenths the length; columella vertical, not reaching the base, abruptly truncated; aperture semioval, subdilated below. Length 43, breadth 15; of aperture, length 19, breadth 8 mill.

Fig. 11.

Glandina turris.

Achatina turris (*Glandina*), PFEIFFER, Symb. III, 91; Mon. II, 285; Brit. Mus. Pulm. 25.—REEVE, Con. Icon. 45.—Not of DESHAYES.

Glandina alberti, var. *turrita*, CARPENTER, Cat. Prov.

Glandina turris, CARPENTER, Maz. Cat. 175 (1856).—TRYON, Am. Journ. Conch. II, 227, pl. 1, f. 8 (1866).

Mazatlan.

Glandina bullata, GOULD. — Shell elongate ovate, ventricose, widest a little behind the middle, very light and thin,

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and so translucent as to show the whole of the pillar by transmitted light, very pale horn-color, tinged with rusty brown towards the aperture, shining, and marked longitudinally with fine, rounded striæ; whirls five, tumid, the last composing about seven-eighths of the shell; suture delicate, not strongly impressed; aperture two-thirds the length of the shell, narrow lunate, somewhat dilated by the moderate arching of the pillar margin, the lower third of which takes the direction of the axis; pillar margin covered by a delicate lamina of white callus. Length of axis 37, breadth 20 mill.

Fig. 12.

Glandina bullata.

Glandina bullata, Gould, Pr. Bost. S. N. H. III, 64 (1848); T. M. II, 298, pl. lxii, a.—W. G. Binney, T. M. IV, 139.—Tryon, Am. Journ. Conch. II, 226, pl. i, f. 5 (1866).

Achatina bullata, Pfeiffer, Mon. Hel. III, 512.

Oleacina bullata, Pfeiffer, Brit. Mus. Cat. 24.

Near New Orleans, and in St. Laundry Parish, Louisiana.

Cat No.	No. of Sp.	Locality.	From whom received.	Remarks.
8666	2	Grand Coteau, La.	St. Charles College.	.....

Glandina texasiana, Pfeiffer.—Shell oblong, rather solid, with crowded longitudinal striæ, shining pellucid, flesh colored; spire convex-conic, obtuse; suture pale, minutely denticulated; whirls rather convex, the last rather longer than the spire, somewhat attenuated at the base; columella quite arched, forming at its base a white, twisted, abruptly truncated lamina; aperture scarcely oblique, acutely-oval; peristome simple, obtuse. Length 29, diameter 10½; length of aperture 16, breadth 5½ mill.

Fig. 13.

Glandina texasiana.

Glandina truncata, var., Binney, T. M. pl. lxi, f. 2.?

Achatina texasiana, Pfeiffer, Novit. Conch. 8, p. 82, pl. xxii, f. 11, 12 (1857); Proc. Zool. Soc. 1856.

Glandina texasiana, W. G. Binney, T. M. IV, 140, pl. lxxvii, f. 21.?—Tryon, Am. Journ. Conch. II, 226, pl. i, f. 4 (1866).

Oleacina texasiana, Pfeiffer, Mon. Hel. IV, 641.

Texas.

Fig. 13 is a fac-simile of one of Pfeiffer's figures.

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Spurious Species of Glandina.

Glandina marminii, Deshayes, is referred doubtfully to North America in Beck's Ind. 78.

Spurious Species of Vermivora.

Testacella ——. (Hitchcock's Geol. Rep. Mass 1835, 27.) It is impossible to say what is referred to; certainly not a *Testacella*, as that genus is not found native to North America.

Testacella haliotoidea. A single specimen found in a greenhouse in Nova Scotia. Probably imported on plants.

Sect. 2. Phyllovora. The buccal mass small, ovoid, not produced. Jaw distinct, horny, except in *Cylindrellidæ*; teeth on numerous, four-sided plates, close together on the lingual membrane. Mostly herbivorous.

* *Mantle (either discal or spiral) defined, on the middle of the back. Pulmonary cavity under the mantle, and attached to it. Head without any lateral grooves.*

Family CYLINDRELLIDÆ.

Lingual membrane very long and narrow; teeth arranged *en chevron*, joined two by two at their bases.

Jaw wanting.

Body short, stout, spiral, protected by a well-developed shell. Head with a simple, non-projectile buccal sack. Eyes at the ends of moderate peduncles; tentacles stout, quite small. Mantle thin, covered with a shell capable of containing the whole animal; respiratory orifice at the right side beneath the margin of the shell. Foot short, broad, without a distinct locomotive disk, simple posteriorly. Vent near the respiratory orifice. Orifice of the reproductive organs —?

Shell spiral, cylindrical, or turreted, white or variegated, outer lip thickened; aperture circular.

CYLINDRELLA, Pfr.

Shell cylindrical or pupæform, multispiral, generally truncated; with remarkable differences in the form of the axis, often furnished with revolving laminæ or other curious processes;

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Fig. 14.

Lingual[1] dentition of *Cylindrella scæva.*

aperture subcircular, edentulate; peristome expanded, continuous.

No jaw.

Teeth of the lingual ribbon joined at the base two by two, and placed in chevron-like rows, inclining obliquely to the centre of the ribbon.

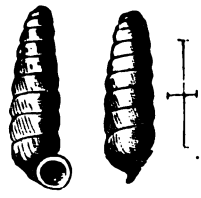
SUBGENUS **GONGYLOSTOMA**, Albers.

Shell cylindrically-fusiform or conic-turreted, apex attenuated, costellately-striate; whirls 9–20, the last more or less protracted, terete, sometimes obsoletely angulated; aperture circular, peristome expanded in every part.

Animal small and short compared with the shell, in general like that of *Helix;* eye-peduncles of medium length, the tentacles quite short. Motions sluggish; the shell drags horizontally, nearly in the line of motion.

Cylindrella poeyana, D'ORBIGNY.—Shell very long, thin, horn-colored or whitish, longitudinally strongly striated; spire very long, inflated, acuminate behind, truncated; whirls eleven, rather convex, the last carinated before; aperture round; peristome acute and continuous, in contact with the preceding whirl. Axis simple. Length 15, breadth 4 mill.

Fig. 15.



Cylindrella poeyana.

Pupa poeyana, D'ORBIGNY, Moll. Cuba, I, 185, pl. xii, f. 24–26.

Cylindrella poeyana, PFEIFFER, Mon. Hel. Viv. II, 380.—CHEMNITZ, ed. 2, 20, pl. iii, ff. 29–31.—W. G. BINNEY, T. M. IV, 149.

Cylindrella lactaria, GOULD in T. M. pl. lxix, f. 2, not in text.

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[1] Not being able to obtain the animal of any North American species, I have figured the lingual membrane of *C. scæva*, Gundl., from Cuba, kindly furnished me by Mr. Bland. There are no less than 130 chevron-like rows of 53 teeth each (26—1—26); the central very small, obtusely pointed, laterals uncinated, thorn-like, joined two by two; the upper edge of the plates are fringed.

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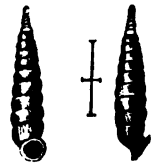
Florida and Cuba.

The description in the Terrestrial Mollusks is drawn from the *lactaria*, Gould, which is identical with *variegata*, Pfr., and is characterized by flexuose milk-white lines and more delicate striæ.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
3698	5	Florida.	W. G. Binney.	Cab. series.

Cylindrella jejuna, Gould.—Shell rather small, fusiform, truncated at apex, quite solid, of a pale horn-color, longitudinally striped with delicate, white lines; spire composed of about nine whirls, though when entire the whole number would be about twice as many; they are convex, and separated by a well-marked suture; the last whirl has a delicate carina, and extends in a short neck; the aperture is bell-shaped, the peristome white, continuous, and not in contact with the preceding whirl. Axis simple. Length 10, breadth about 2½ mill.

Fig. 16.



Cylindrella jejuna.

Cylindrella jejuna, Gould, Proc. Bost. Soc. Nat. Hist. III, 41, June, 1848; Terr. Moll. II, 310, pl. lxix, f. 3.—W. G. Binney, T. M. IV, 150.

Cylindrella variegata, Pfeiffer, part, Mal. Blatt. II, 13.

Found abundantly in Florida.

Cylindrella irregularis, Gabb.—Shell about an inch long, slender; spire irregularly tapering, the first three whirls being of the same diameter, the next five to seven whirls increasing steadily, after which the remainder are nearly of the same diameter; apex not always exactly in the apex of the shell; whirls sixteen to eighteen, rounded on the side, body-whirl slightly subangulated below; suture impressed; umbilicus minutely perforate, and bordered by a slight angle; aperture irregular in outline, angulated internally, above and below; outer lip but slightly expanded; inner lip curved internally, and expanded so as to hide the umbilical region in part, most expanded in the middle, and in some specimens distinctly subangulated at this point. Surface sculptured by small longitudinal, slightly arched ribs; color light horn brown. (*Gabb.*)

Fig. 17.

Cylindrella irregularis.

Cylindrella irregularis, Gabb, Am. Journ. Conch. III, 238, pl. xvi, f. 4 (1867).

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High table-lands of the interior of Lower California (*Gabb*).

The specimen figured is one of the original lot found by Mr. Gabb.

SUBGENUS **HALOSPIRA**, Mart. & Alb.

Shell rimate, turreted or fusiform, apex conical, not truncated; whirls 11–14, the last not at all or but slightly protracted, carinated at base; columella plicate; aperture quadrangular, peristome free, expanded.

Cylindrella roemeri, PFR.—Shell scarcely rimate, subcylindrical, with an obtusely-conic non-truncated spire, substriate, light flesh-colored; whirls fourteen, narrow, rather flattened, the last carinated at base, separated from the shell and twisted; aperture vertical, oblong, circular, within narrowed by a fold on its right margin; peristome continuous, equally and briefly expanded. Length 13–14, diam. 4½ mill.; ap. 3 mill. long, 2½ broad.

Fig. 18.

C. roemeri.

β. Smaller, more ventricose above; whirls twelve, the last more briefly loosened. Length 11, diam. above the middle 4 mill.

Cylindrella roemeri, PFEIFFER, Mon. Hel. Viv. II, 383; in ROEMER's Texas, 456; in CHEMN. ed. 2, no. 81, pl. vii, f. 4–6.—W. G. BINNEY, T. M. IV, 150.

New Braunfels, Texas.

Cylindrella goldfussi, MENKE.—Shell umbilicated, elongated, more ventricose at the middle, apex conic, not truncated, thin, diaphanous, light horn-color, marked with numerous light, subarcuate striæ; whirls twelve, scarcely convex, narrow, the last slightly extended beyond the body of the shell, carinated, its right side somewhat furrowed, rounded at base; aperture subvertical, obliquely and subtriangularly pear-shaped; peristome slightly expanded at its entire circumference, its right termination flexuose. Axis with revolving lamella, and also with a curious one on the under side of the septum of the third whirl from the base. Length 11, diameter 4½ mill.

Fig. 19.

C. goldfussi.

Cylindrella goldfussi, MENKE, in Zeitsch. f. Mal. 1847, III, 2.—PFEIFFER, Mon. Hel. Viv. II, 383.—PHILLIPPI, Icon. III, 6, tab. iii, 9 (1847).—W. G. BINNEY, T. M. IV, 151, pl. lxxix, f. 33.

Texas, on the Blanco.

In the penultimate whirl of *C. goldfussi* there are four lamellæ:

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one strongly developed, situated on the under side of the upper septum, and in length about equal to one-half of the circumference of the whirl; another on the upper surface of the lower septum, immediately beneath and opposite to the above-mentioned lamella, and of about equal length, but not so much developed; a third lamella on the middle of the lower half of, and revolving on the axis; the fourth on the inner side of the outer wall of the shell (opposite the axial lamella), and visible from the exterior. (*Bland.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8419	8	Banks of the Blanco.	Dr. B. F. Shumard.	.....
8693	3	" " "	"	Cab. series.

SPURIOUS SPECIES OF CYLINDRELLA.

Cylindrella pontifica, GOULD, is *Macroceramus kieneri*, PFR.

FAMILY HELICIDÆ.

Lingual membrane with numerous similar, transverse rows of teeth.

Jaw smooth, striated or ribbed, with or without a central projection on its concave margin, single, or composed of numerous separate plates.

Body elongate, attached its whole length to the upper surface of the foot, or more or less spiral and prominent on the middle of the upper surface of the foot. Eyes at the end of long, cylindrical, retractile peduncles; tentacles shorter, retractile, sometimes wanting. Mantle thin, small, discal or spiral, on the middle of the back; respiratory orifice subcentral, on the right side. Foot narrow, elongate, without a distinct locomotive disk, simple posteriorly. Vent near the respiratory orifice, central. Orifice of reproductive organs usually below the respiratory orifice or behind the right eye-peduncle.

Shell very variable in form, sometimes rudimentary and internal.

SUBFAMILY VITRININÆ.

Jaw smooth, usually neither striated nor ridged, with a blunt middle projection.

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The middle tooth of the lingual ribbon short, tricuspid; laterals of the same shape, but bicuspid; uncini thorn-shaped, curved.

VITRINA, Drap.

Shell imperforate, pellucid, glassy, depressed; spire short; whirls 2–3, rapidly increasing, the last dilated; aperture ample, peristome thin, often membranous.

Fig. 20.

Animal of *Vitrina*.[1]

Animal: body elongated, limaciform; mantle covering the back and neck, and extending to the base of the eye-peduncles, with one or more processes or prolongations of its margin, which are reflected upon the shell; tentacles very short. Respiratory orifice in the mantle, behind its usual position in the *Limaces*. Generative orifice behind and below the eye-peduncle.

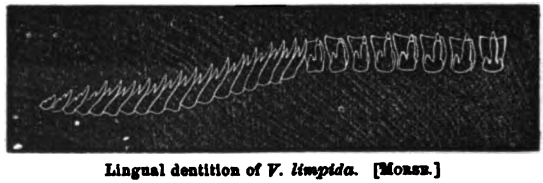
Fig. 21.

Jaw of *Vitrina*.[1]

Jaw arcuate, concave margin with a median, beak-like projection.

Lingual membrane with long slender teeth; centrals tricuspid, laterals bicuspid, in straight transverse series; uncini long,

Fig. 22.



Lingual dentition of *V. limpida*. [Morse.]

curved, thorn-shaped, bidentate, in a curved transverse series, and diminishing in size as they pass off laterally.

Vitrina limpida, Gould.—Shell globose-discoid, thin, fragile, transparent, shining; whirls two and a half to three, scarcely convex, with very minute lines of increase, the last whirl large, and much expanded;

[1] *V. major* from Moquin-Tandon.

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suture not much impressed, sometimes with an impressed line revolving near it; aperture large, subovate, somewhat diminished by the intrusion of the penultimate whirl; peristome thin and acute, the columellar margin a little reflected; axis imperforate. Greatest transverse diameter nearly 6 mill.

Fig. 23.

Vitrina limpida.

Vitrina pellucida, DeKay, N. Y. Moll. 25, pl. iii, f. 42 (1843), not of Müller.—Adams, Sh. of Vt. 162.—Binney, T. M. II, 58, pl. lxvii, a, f. 1.

Vitrina americana, Pfeiffer, Dec. 1852, Proc. Zool. Soc. 156.—Chemnitz, ed. 2, 9, pl. i, f. 22–25 (1854).

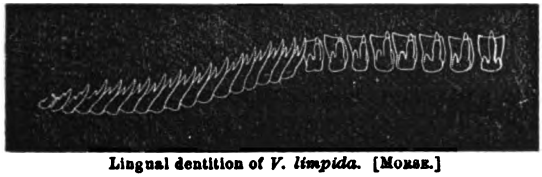
Vitrina limpida, Gould, in Agassiz' Lake Superior, p. 243, 1850; Terr. Moll, *l. c.*—Pfeiffer, Malac. Blatt. II, 10 (1856); Mon. Hel. Viv. IV, 798.—W. G. Binney, T. M. 33.—Reeve, Con. Icon. 62.—Morse, Journ. Portl. Soc. I, 11, pl. v, f. 17 (1864); in Amer. Nat. I, 314, f. 20 (1867).—Treos, Am. Journ. Conch. II, 243, pl. iii, f. 1 (1866).

Found in Maine, Vermont, New Brunswick, and to the northwest of Lake Superior. An accidentally introduced colony has lately been found by Dr. Lewis, at Mohawk, N. Y.

Animal whitish, grayish, or blackish, large compared with the shell. Head, eye-peduncles, and eyes black; tentacles very short. The prolongation of the mantle extends from under the shell, over the back and neck to the base of the eye-peduncles, but is unattached and free; from the right side of the mantle posteriorly, there arises a tongue-shaped process, which is reflected back upon the shell, and reaches to the spire. Respiratory foramen in the posterior part of the mantle.

Lingual membrane with 90 rows of long, slender teeth, fifty-one teeth in each row (25—1—25); centrals tricuspid; laterals

Fig. 24.



Lingual dentition of *V. limpida*. [Morse.]

bicuspid, in straight transverse rows; laterals thorn-shaped, somewhat curved, with two acute points, in curving transverse rows, becoming smaller as they pass off laterally.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8832	4	Portland, Me.	T. Bland.	.....

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Vitrina angelicæ, Beck.—Shell convexly depressed, smooth, polished, pellucid, greenish-yellow; spire short, subprominent; suture delicately crenulated; whirls three and one-half, rapidly increasing, the last broad below; aperture oblique, lunate-oval; peristome simple, subinflected, its columellar margin not receding and slightly arched. Greatest diam. 6, lesser 4⅔; height 3½ mill.

Fig. 25.

Vitrina angelicæ, enlarged.

Vitrina angelicæ, Beck, Ind. 1.—Möller, Ind. Moll. Gr. 4 (1842).—Pfeiffer, Mon. Hel. Viv. II, 510.—Mörch, Nat. Bidr. v. Gr. 76.—W. G. Binney, T. M. U. S. IV, 32, pl. lxxix, f. 9.—Reeve, Con. Icon. 45.—Tryon, Am. Journ. Conch. II, 243, pl. ii, f. 2 (1866).

Helix pellucida, Fabricius, Fauna Gr. 389, excl. syn. Müller (1780).

Helix domestica, Ström.[1] Der Tronh. Videnak. III. 435, pl. vi, f. 15.

Greenland.

Vitrina pfeifferi, Newcomb.—Shell moderately depressed, smooth, shining, pellucid, greenish-white; whirls three, the last composing most of the shell; suture very finely margined; aperture large, obliquely and roundedly ovate; lip thin, columella arched. Diam. 5, axis 2 mill. (*Newcomb.*)

Fig. 26.

Vitrina pfeifferi, enlarged.

Vitrina pfeifferi, Newcomb, Proc. Cal. Acad. Nat. Sci. II, 92 (1861).—Tryon, Am. Journ. Conch. II, 244, pl. iii, f. 3 (1866).

Carson Valley, Nevada to Owen's Valley, California.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9354	1	Carson Valley.	Dr. J. G. Cooper.	Type figured.

Fossil Species of Vitrina.

Vitrina obliqua, Meek & Hayden, Proc. Phila. Acad. Nat. Sci. 1857, 134.

[1] This name I give to a little snail, which is represented by fig. 15, since I find nothing in Linné's Systema Nat. to which I can with certainty refer it. It is small, ovate-rounded, and somewhat convex above, and shows three small and flat whirls on the one side. The aperture is large and may be called almost entirely round, and the columella, or part attached to the snail's house, comprises a small segment, or may be inscribed in an exact circle. The shell is yellowish, and so brittle that one cannot pick it up without breaking it in pieces. It contains a bluish snail. It is found in great numbers under the moss or turf on houses, and is sometimes fully as large as the figure, which represents both the upper and lower sides. (*Ström.*)

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HYALINA, (Fér.) Gray.

Animal as in *Helix*.

Shell generally umbilicated, thin, shining, greenish or reddish horn-color; whirls 5–7, regularly increasing, the last not descending, generally anteriorly dilated; spire depressed, very rarely orbicularly-conic; aperture roundly-lunate; peristome thin, acute, straight.

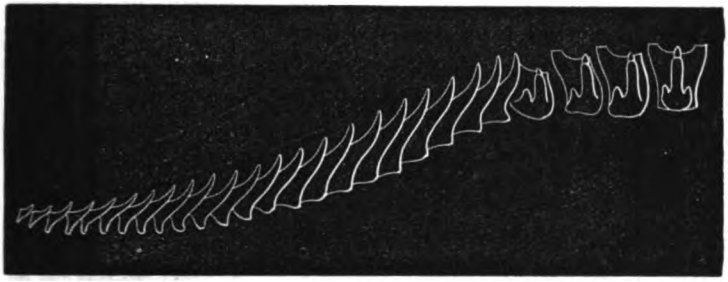
Fig. 27.

Jaw of *Hyalina fulva*.

Jaw simple (neither furrowed nor dentate), arcuate, its lower edge acute, with a rostriform projection in the middle.

Lingual membrane with central tricuspid teeth, a few bicuspid laterals in a straight row, and numerous thorn-shaped, curved

Fig. 28.



Lingual dentition of *Hyalina viridula*.

uncini in a curving transverse series, modified greatly in size as they pass off laterally.

Subgenus HYALINA, s. str.

Shell umbilicated, sometimes perforated, depressed, glassy, shining; whirls 5–6, regularly increasing; spire very rarely elevated-conic; aperture roundly lunate; peristome thin, acute, straight.

Fig. 29.

Animal of *H. cellaria*.

Animal with long, slender eye-peduncles and short tentacles; orifice of respiration on the right side under the edge of peristome; orifice of generation on the right side of the head.

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Body elongated, semi-cylindrical, tapering to a point posteriorly, convex above, plane beneath, the whole area forming a locomotive disk; integument reticulated by furrows surrounding numerous longitudinal mucus glands; mantle simple, not extending beyond, and accurately fitting to, the peristome of the shell, into which the whole animal may retire; head obtuse, without a constricted neck.

Hyalina cerinoidea, ANTHONY. — Shell perforated, globosely flattened, shining, light horn color, scarcely wrinkled by lines of growth; whirls seven, hardly convex, the last slightly inflated below; aperture oblique, subcircular; peristome simple, acute, its ends joined by a light callus. Greater diam. 7, lesser 6; height 3 mill.

Fig. 30.

Hyalina cerinoidea.

Helix cerinoidea, ANTHONY, Am. Journ. Conch. I, 251, pl. xxv, f. 4 (Oct. 1865).

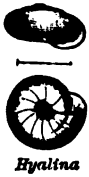
Mesomphix cerinoidea, TRYON, Am. Journ. Conch. II, 255, pl. iv, f. 36 (1866).

North Carolina.

The specimen figured was loaned by Mr. Anthony.

Hyalina cellaria, MÜLLER.—Shell very much depressed, thin, fragile, pellucid; epidermis light greenish horn-color, smooth, highly polished; whirls five, slightly rounded, with minute and almost imperceptible, oblique striæ; aperture not dilated, its transverse diameter the greatest; umbilicus moderate, regularly rounded, deep; base rounded, thickened within by a testaceous deposit, bluish-white; peristome simple, acute. Greater diam. 13, lesser 11½; height 5 mill.

Fig. 31.



Hyalina cellaria.

Helix cellaria, MÜLLER, Hist. Verm. II, 28.—PFEIFFER, Mon. I, 111.—BINNEY, Bost. Journ. III, 421; Terr. Moll. II, 230, pl. xxix, f. 4.—GOULD, Inv. 180, f. 104, excl. syn.? (1841).—DEKAY, N. Y. Moll. 37, pl. iii, f. 35 (1843).—LEIDY in Terr. Moll. U. S. I, 233, pl. vii, f. 1 (1851), anat.—W. G. BINNEY, Terr. Moll. IV, 111.

Hyalina cellaria, MORSE, Journ. Portl. Soc. I, 12, f. 18, 19, pl. v, f. 20 (1864).—TRYON, Am. Journ. Conch. II, 249, pl. iii, f. 19 (1866).—MORSE in Amer. Nat. I, 541, f. 29 (1867).

Helix glaphyra, SAY, Nich. Encycl. Am. ed. pl. i, f. 3; BINNEY's ed. 7, pl. lxix, f. 3.—EATON, Zool. Text-Book, 194.—BLAND, N. Y. Lyc. Ann. VI, 352, not of PFEIFFER, REEVE, DESHAYES.

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An European species introduced by commerce into some of the Atlantic ports. It is common in damp cellars in Boston, and has been noticed during the last year (1862) in Providence, Salem, Lynn, Marblehead, Portland, Halifax Linsley includes it in his List of Connecticut Shells. In 1864 it was found at Astoria, Long Island, New York.

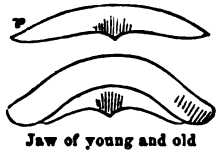
Fig. 32.

Helix glaphyra.

The synonymy of the species is discussed in full by Mr. Bland and myself (*l. c.*). A fac-simile of Say's figure of *H. glaphyra* is here given.

Animal (see p. 29): Upper surface light indigo blue, darkest on the head, neck, and eye-peduncles, collar greenish, eyes black; foot narrow and slender, not much exceeding in length the diameter of the shell, terminating acutely.

Fig. 33.

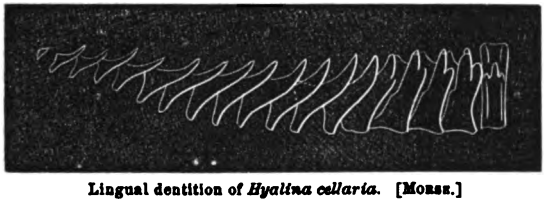


Jaw of young and old *Hyalina cellaria.* [Morse.]

Jaw strongly arcuate, ends bluntly rounded; centre of anterior surface slightly striate; concave margin smooth, with a median projection.

Lingual membrane with 38 curving rows of 17—1—17 teeth each; centrals long, with three short obtuse cusps; laterals four, bicuspid, inner cusp

Fig. 34.



Lingual dentition of *Hyalina cellaria.* [Morse.]

shorter; uncini thorn-shaped, curved, decreasing rapidly in size as they pass off laterally.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8035	1	Halifax, N. S.	.....	.....
8629	3	Boston (Mt. Vernon St.).	W. G. Binney.	Cab. series.
8772	6	" "	W. Stimpson.	.....

Hyalina nitida, Müller.—Shell orbicular, depressed, moderately convex above and concave below, thin, shining, uniform brownish horn-color, with delicate striæ of growth; whirls five or more, convex, separated

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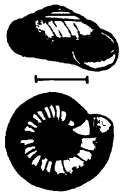
by a deeply impressed suture, the outer one disproportionately large, somewhat declining as it approaches the aperture, and obtusely angular at the periphery, beneath excavated around a broad, crateriform umbilicus, in which the whirls are displayed to the apex; aperture oblique, lunate; peristome simple, its basal margin arcuate. Greater diam. 7½, lesser 6, height 3⅔ mill.

Fig. 35.



Hyalina nitida.

Helix nitida, Müller, Hist. Verm. II, 32, &c.—Pfeiffer, Mon. II, 94.

Helix lucida, Draparnaud, Moll. Fr. 103, pl. viii, f. 11, 12.—Binney, Terr. Moll. II, 233, pl. xxii, a, f. 2.—W. G. Binney, Terr. Moll. IV, 116.

Helix hydrophila, Ingalls in coll., unpublished.

Hyalina nitida, Tryon, Am. Journ. Conch. II, 250, pl. iv, f. 24 (1866).

Fig. 36.

Hyalina nitida. [Moq.-Tand.]

An European species, found at Great Slave Lake, Fort Resolution in British America, and in New York and Ohio. Fig. 36, copied from Moquin-Tandon, represents a specimen from France.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8679	8	Greenwich, Washington Co., N. Y.	W. G. Binney.	= *hydrophila*, Ingalls. Cab. series.
9276	10	Peace River.	R. Kennicott.	.....
9076	2	British America.	"	.....

Hyalina whitneyi, Newcomb.—Shell umbilicated, greatly depressed, thin, smooth, scarcely marked by the delicate wrinkles, shining, smoky horn-color; spire slightly elevated; whirls four, flattened, the last planulate above and below; umbilicus broad, pervious; aperture transversely subcircular; peristome acute, simple. Greater diam. 5½, lesser 4½; height 2 mill.

Fig. 37.

Hyalina whitneyi.

Helix whitneyi, Newcomb, Proc. Cal. Acad. Nat. Sci. III, 118 (1864).

Patula whitneyi, Tryon, Am. Journ. Conch. II, 263 (1866).

In the Sierra Nevada, near Lake Tahoe, California, under damp logs and bark.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9352		.....	Dr. J. G. Cooper.	Type figured.

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Hyalina arborea, Say.—Shell umbilicated, depressed, very slightly convex, thin, pellucid; epidermis amber-colored, smooth, shining; whirls four to five, with very minute, oblique striæ, apparent when viewed with the microscope; aperture transversely rounded; peristome thin, acute; umbilical region indented; umbilicus moderate, well developed, round, and deep. Greater diam. 5, lesser 4½; height 2¾ mill.

Fig. 38.

Hyalina arborea.

Helix arborea, Say, Nich. Encyc. pl. iv, f. 4; Binney's ed. 5, pl., lxxii, f. 5 (1817, 1818, 1819).—Eaton, Zool. Text-Book, 193 (1826).—Binney, Bost. Journ. Nat. Hist. III, 422, pl. xxii, f. 1 (1840); Terr. Moll. II, 235, pl. xxix, f. 3.—DeKay, N. Y. Moll. 30, pl. ii, f. 10 (1843).—Gould, Invertebrata, 182, f. 110 (1841).—Adams, Vermont Mollusca, 160 (1842).—Pfeiffer, Mon. Hel. Viv. I, 95.—Chemnitz, 2d ed. II, 114, tab. lxxxv, f. 33–35.—Reeve, Con. Icon. 733.—W. G. Binney, Terr. Moll. IV, 116.—Morse, Amer. Nat. I, 542, f. 30 (1867).

Helix ottonis, Pfeiffer, olim, Weigm. Arch. 1840, I, 251.—Binney, Terr. Moll. II, 238, pl. xxix, a, f. 3.—W. G. Binney, T. M. IV, 117.

Hyalina arborea, Morse, Journ. Portl. Soc. I, 14, f. 28, pl. vi, f. 29 (1864).—Tryon, Am. Journ. Conch. II, 251, pl. iii, f. 17 (1866).

Hyalina ottonis, Tryon, Am. Journ. Conch. II, 251, pl. iv, f. 26 (1866).

From Labrador to Texas and on the Rio Chama in New Mexico; from Florida to Great Slave Lake; also in Washoe Co., Nevada; in Montana and California. It is also said to be found in Cuba; also in Guadeloupe.

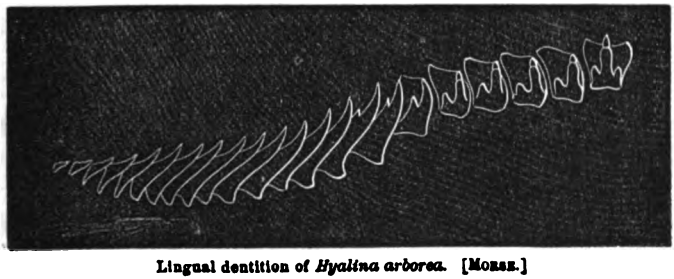
Fig. 39.

Jaw of *Hyalina arborea*. [Morse.]

Jaw arcuate, narrow, with curving, pointed ends; anterior surface with a few striæ; concave margin smooth, with a wide median projection; convex margin with a corresponding depression.

Lingual membrane with 82 rows of 21—1—21 teeth of the

Fig. 40.



Lingual dentition of *Hyalina arborea*. [Morse.]

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same character as the other species of the subgenus described above; the two inner laterals with a small lateral denticle.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7932	39	Mohawk, N. Y.	Dr. J Lewis.	"*H. hydrophila*," J. L.
7952	21	Milwaukee, Wis.	I. A. Lapham.	.....
7953	10	Mohawk, N. Y.	Dr. J. Lewis.	.....
7954	4	Big Sioux.	.....	"*H. lucida*," teste Lea.
8003	22	Kansas.	.....	.....
8004	3	Minnesota.	I. A. Lapham.	.....
8005	17	Marietta, O.	W. Holden.	.....
7971	13	Kansas.	.....	Dupl.
8811	13	Georgia.	Dr. J. Lewis.	Cab. series.
8778	1	Canso, Labrador.	W. Stimpson.	.....
8780	4	Massachusetts.	"	.....
9082	2	English River.	R. Kennicott.	.....

Hyalina viridula, MENKE.—Shell umbilicated, small, depressed, thin, fragile; epidermis pale, or brownish horn-color, wrinkled, shining; whirls four, the last rapidly enlarging towards the aperture; aperture transversely rounded; peristome simple, its edge rather thickened, not acute; umbilicus small, but well marked and constant. Greater diam. 5, lesser 4¾; height 2 mill.

Fig. 41.

Hyalina viridula.

Helix electrina, GOULD, Invert. 183, f. 111 (1841).—BINNEY, Bost. Journ. Nat. Hist. III, 423, pl. xxii, f. 2 (1840); T. M. II, 286, pl. xxix, f. 1.—DEKAY, N. Y. Moll. 30 (1843).—ADAMS, Vermont Mollusca, 161 (1842).—W. G. BINNEY, Terr. Moll. IV, 107.—MORSE, Amer. Nat. I, 542, f. 31 (1867).

Helix pura, ALDER, teste PFEIFFER, Mon. Hel. IV, 83.

Helix janus, ADAMS MS. (olim), Shells Vt. Am. J. Sc. [1], XL, 273 (1841).

Zonites radiatulus, REEVE, Br. Land and Fr.-W. Sh. 50, fig. (1863).

Zonites striatula, MOQUIN-TANDON, Moll. Fr. teste REEVE.

Helix viridula, MENKE, Syn. Meth. ed. 2, 127; see also Mal. Blatt. VIII, 92.

Hyalina electrina, MORSE, Journ. Portl. Soc. I, 13, f. 23, pl. vi, f. 24 (1864).—TRYON, Am. Journ. Conch. II, 251, pl. iv, f. 25 (1866).

From Great Slave Lake to the Gulf of Mexico. Also in Europe.

Fig. 42.

Jaw of *Hyalina viridula*. [MORSE.]

Jaw arcuate, ends attenuated, pointed; anterior surface centrally somewhat striate; concave margin smooth, with a median rounded projection, on each side of which are two notches.

Lingual membrane with 54 rows of 27—1—27 teeth, arranged

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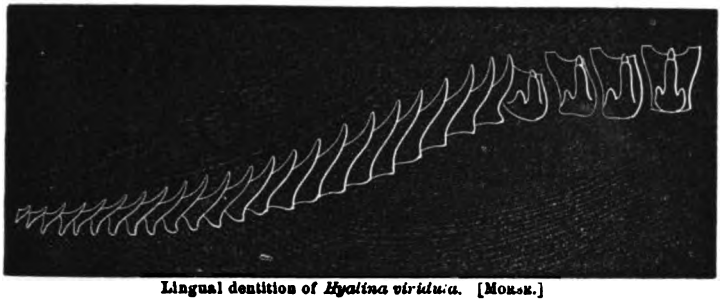
Fig. 43.



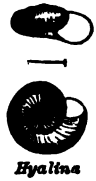
Lingual dentition of *Hyalina viridula*. [Morse.]

and of the same form as the species of the subgenus already described.

Cat. No	No. of Sp.	Locality.	From whom received.	Remarks.
7955	4	Kansas.	.....	Among river-bank
7963	56	Mohawk, N. Y.	Dr. J. Lewis.	..... [rubbish.
8667	10	Massachusetts.	W. Stimpson.	Cab. series.
9080	1	British America.	R. Kennicott.	.....

Hyalina indentata, Say.—Shell subperforated, flattened, thin, pellucid; epidermis highly polished, corneous; whirls rather more than four, rapidly enlarging, with regular, sub-equidistant, radiating, impressed lines, which on the body-whirl extend to the centre of the base, outer whirl expanding towards the aperture; suture well impressed; aperture rather large, transverse; peristome simple, acute, very thin, at its inferior extremity terminating at the centre of the base of the shell; umbilicus none, but the umbilical region is indented. Greater diam. 5, lesser 4½; height 2½ mill.

Fig. 44.



Hyalina indentata.

Helix indentata, Say, Journ. Acad. II, 372 (1822); Binney's ed. 24.—Binney, Bost. Journ. Nat. Hist. III, 415, pl. xxii, f. 3 (1840); Terr. Moll. II, 242, pl. xxix, f. 2.—DeKay, N. Y. Moll. 31, pl. iii, f. 26 (1843).—Gould, Invert. 181, f. 109 (1841).—Adams, Vermont Mollusca, 160 (1842).—Chemnitz, 2d ed. I, 21, pl. xxxiv, f. 12–15.—Pfeiffer, Mon. Hel. Viv. I, 59.—Reeve, Con. Icon. 730 (1852).—W. G. Binney, T. M. IV, 119.—Morse, Amer. Nat. I, 413, f. 28 (1867).

Hyalina indentata, Morse, Journ. Portl. Soc. I, 12, f. 21, pl. ii, f. 11; pl. v, f. 22 (1864).—Tryon, Am. Journ. Conch. II, 246, pl. iii, f. 11 (1866).

Inhabits all of eastern North America, having been found from Canada to Texas and from Dacotah to Florida. It is also said to occur in St. Domingo.

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A variety with an open umbilicus is sometimes found (Fig. 45).

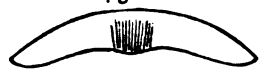
Fig. 45.

Hyalina indentata, var.

Jaw somewhat arcuate, long, narrow, ends somewhat attenuated, pointed; anterior surface with central longitudinal striæ; concave margin smooth, with a slightly developed, broad median projection.

Lingual membrane very broad, with 53 rows of 79 teeth each (39—1—39); centrals tricuspid, the median cusp very large and longer than the plate on which it rests; laterals three only on each side, bicuspid, arranged in a straight transverse row; uncini pointed, curved, thorn-shaped,

Fig. 46.



Jaw of *Hyalina indentata*. [Morse.]

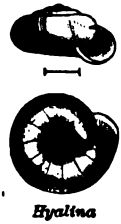
Fig. 47

Lingual dentition of *Hyalina indentata*. [Morse.]

greatly diminishing in size as they pass off laterally, arranged in a slightly crescent-shaped row on each side of the lingual membrane.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7921	42	Columbus, O.	Dr. J. Lewis.	.....
7922	5	Cape Elizabeth, Me.	"	.....
8395	12	.....	W. G. Binney.	Cab. series.
8771	8	Massachusetts.	W. Stimpson.	.....
8992	2	Western Texas.	.....	.....

Fig. 48.



Hyalina limatula.

Hyalina limatula, Ward.—Shell widely umbilicated, small, depressed, thin; epidermis whitish, immaculate; suture distinctly impressed; whirls more than four, convex, with very fine, oblique, parallel striæ, which become obsolete on the base; aperture oblique, subcircular, slightly modified by the penultimate whirl; peristome thin, acute, its ends approaching; umbilicus rounded, large and deep, not exhibiting all the volutions. Greater diam. 5½, lesser 5; height 2½ mill.

Helix limatula, Ward, MSS. in Binney, Bost. Journ. Nat.

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Hist. III, 434, pl. xxi, f. 2 (1840); Terr. Moll. U. S. II, 219, pl. xxx, f. 3.—Pfeiffer, Mon. Hel. Viv. I, 113; IV, 85.—W. G. Binney, T. M. IV, 100.

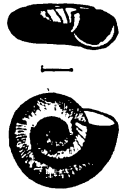
Pseudohyalina limatula, Tryon, Am. Journ. Conch. II, 264, pl. iv, f. 65 (1866).

From New York to Michigan; also in Indiana.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8680	1	.....	W. G. Binney.	Cab. series.
8792	6	.....	.....	.....

Hyalina duranti, Newcomb.—Shell widely umbilicated, depressed, discoidal, of a dead white or greenish color, thin, with very coarse, rough striæ; whirls four, flattened, the last discoidal, not descending at the aperture, below broadly excavated and channelled; suture delicate; aperture removed from the axis, transversely rounded; peristome simple, acute, its terminations approaching, joined by callus, that of the columella not reflected. Greater diam. 4, height 1½ mill.

Fig. 49.



Hyalina duranti.

Helix duranti, Newcomb, Proc. Cal. Acad. Nat. Sci. III, 118 (1864).

Patula duranti, Tryon, Am. Journ. Conch. II, 263, pl. iv, f. 53 (1866).

Santa Barbara Island, California.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9347	5	Sta. Barbara Isl., Cal.	Dr. J. G. Cooper.	Type.

Hyalina minuscula, Binney.—Shell umbilicated, minute, depressed-convex; epidermis whitish; whirls four, convex, not increasing rapidly in diameter, with microscopic wrinkles; suture very distinctly impressed; aperture nearly circular; peristome thin, acute; umbilicus large, not spread, deep, and exhibiting the volutions; base rounded, columella with a thin callus. Greater diam. 2½, lesser 2⅓; height 1 mill.

Fig. 50.

Hyalina minuscula.

Helix minuscula, Binney, Bost. Journ. Nat. Hist. III, 435, pl. xxii, f. 4 (1840); Terr. Moll. II, 221, pl. xvii, a, f. 2, excl. syn.—Adams, Vermont Mollusca, 161 (1842).—Chemnitz, 2d ed. II, 112, tab. lxxxv, f. 20–23.—Pfeiffer, Symbol. II, 33; Mon. I, 114.—Reeve, Con. Icon. 731 (1852).—W. G. Binney, T. M. IV, 102.—Morse, Amer. Nat. I, 543, f. 35 (1867).

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Helix minutalis, MORELET, nec. FER. Test. Nov. II, 7.
Helix apex, ADAMS, Contr. Conch. 36.—REEVE, *l. c.* 339.
Helix lavelleana, D'ORBIGNY, Moll. Cub. in text, 161, excl. pl. (1853).
Helix mauriniana, D'ORBIGNY, *l. c.* in pl. viii, f. 20–22, excl. text.
Pseudohyalina minuscula, MORSE, Journ. Portl. Soc. I, 16, f. 34, pl. vii, f. 35 (1864).—TRYON, Am. Journ. Conch. II, 264, pl. iv, f. 62 (1866).

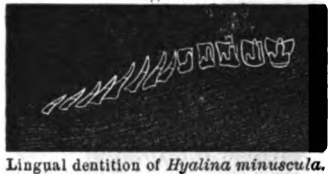
From the Red River of the North to Texas and Florida. It may thus be said to inhabit all eastern North America; has lately been found in California, and is quoted from Bermuda, Cuba, Jamaica, and Porto Rico.

Fig. 51.

Jaw of *Hyalina minuscula*. [MORSE.]

Jaw long, narrow, but slightly arcuate, of almost uniform width, ends rounded; anterior surface with central longitudinal striæ; concave margin smooth, with a slightly developed, broad, median projection.

Fig. 52.



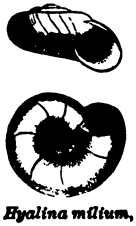
Lingual dentition of *Hyalina minuscula*. [MORSE.]

Lingual membrane with 52 curving rows of 12—1—12 teeth each; centrals tricuspid, laterals bicuspid; uncini curved, acute.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8681	3	.....	J. G. Anthony.	Cab. series.

Hyalina milium, MORSE.—Shell widely umbilicated, depressed, transparent, shining, white, with a greenish tinge, marked with distinct and regular striæ of growth and microscopic revolving lines, the latter more conspicuous below; spire but slightly elevated; whirls three, rounded, rapidly increasing, the last planulate above, widely umbilicated below; aperture very oblique, subcircular, remote from the axis; peristome simple, acute, its terminations somewhat approached, that of the columella not reflected. Greater diam. 1½; height ½ mill.

Fig. 53.



Hyalina milium, enlarged.

Helix milium, MORSE, Proc. Bost. Soc. VII, 28 (1859).—W. G. BINNEY, Terr. Moll. IV, 101, pl. lxxix, f. 4–5.—MORSE, Amer. Nat. I, 543, f. 36 (1867).

Striatura milium, MORSE, Journ. Portl. Soc. I, 18, f. 41, 42, pl. vii, f. 43 (1864).

Pseudohyalina milium, TRYON, Am. Journ. Conch. II, 265, pl. iv, f. 56 (1866).

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Massachusetts and Maine. It is quoted doubtfully from California by Cooper.

The surface of the shell is raised in numerous rib-like folds, frequently anastomosing; longitudinal ribs reticulate the surface and render the folds so crenulated that in certain lights the shell appears as if ornamented with strings of beads. This peculiar character disappears at the base of shell, and is replaced by revolving lines and regular lines of accretion.

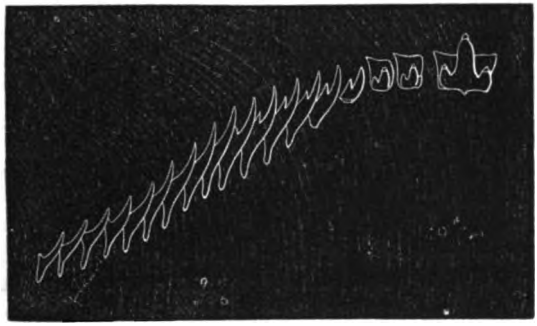
Jaw long, narrow, scarcely arcuate, ends attenuated, pointed; anterior surface smooth, with two deep, longitudinal channels in its centre; concave margin smooth, somewhat prominent in the middle, broken by the channels.

Fig. 54.

Jaw of *Hyalina militum*. [MORSE.]

Lingual membrane with 68 arched rows of thirty-five (17—1—17) teeth each; centrals very large, broad, tricuspid; laterals two on a side, bicuspid;

Fig. 55.



Lingual dentition of *Hyalina militum*. [MORSE.]

uncini thorn-shaped, curved, pointed, greatly diminishing in size as they pass off laterally, the first six with a smaller, lateral point.

Hyalina binneyana, MORSE.[1]—Shell umbilicated, subglobose, transparent, almost colorless, shining, smooth, with microscopic wrinkles of growth and still more delicate oblique wrinkles; spire not much elevated; whirls about four,

Fig. 56.

Hyalina binneyana.

[1] In Am. Journ. Conch. I, 188, Mr. Tryon proposes for this species the name *morsei*, on account of *Helix binneyana*, Pfr. I have retained Morse's name, as it is not preoccupied in the genus *Hyalina*. In his first catalogue of Maine Shells, Mr. Morse uses the name *binneyi*, which can be employed, if necessary, to distinguish the shell from Pfeiffer's.

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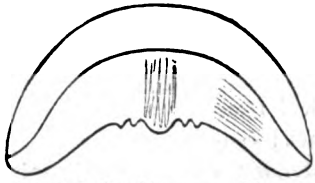
rounded, gradually enlarging, the last globose, broadly umbilicated below: aperture oblique, subcircular, large; peristome simple, acute, extremities not approaching, that of the columella subreflected. Greatest diam. 4, height 2 mill.

Hyalina binneyana, MORSE, Journ. Portl. N. H. Soc. I, 13, f. 25, 26; pl. ii, f. 9; pl. vi, f. 27 (1864).—TRYON, Am. Journ. Conch. II, 252, pl. iv, f. 31 (1866).

Helix binneyana, MORSE, Amer. Nat. I, 542, f. 32 (1867).

Southern part of Maine; Tawas Bay, Mich.

Fig. 57.



Jaw of *Hyalina binneyana*. [MORSE.]

Jaw very broad, arched, ends attenuated, bluntly rounded; anterior surface with some central striæ; concave margin with a small rounded median projection, on either side of which are two smaller projections.

Lingual membrane with 60 rows of 23—1—23 teeth; centrals tricuspid; laterals bicuspid; uncini thorn-shaped.

Fig. 58.

Lingual dentition of *Hyalina binneyana*. [MORSE.]

Hyalina ferrea, MORSE.—Shell umbilicated, depressed-globose, transparent, of a very light steel gray color, not shining, marked with very delicate incremental wrinkles and microscopic revolving lines; spire slightly elevated; whirls three, rounded, the last rapidly enlarging, globose; aperture large, transversely subcircular: peristome simple, acute, its extremities not approaching, that of the columella scarcely subreflected. Greatest diam. 2¼, height 1½ mill.

Fig. 59.

Hyalina ferrea.

Striatura ferrea, MORSE, Proc. Portl. S. N. H. I, 17, f. 36–40, and pl. ii, f. 10 (1864).

Hyalina ferrea, TRYON, Am. Journ. Conch. II, 253, pl. iv, f. 32 (1866).

Helix ferrea, MORSE, Amer. Nat. I, 544, f. 37 (1867).

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Maine.

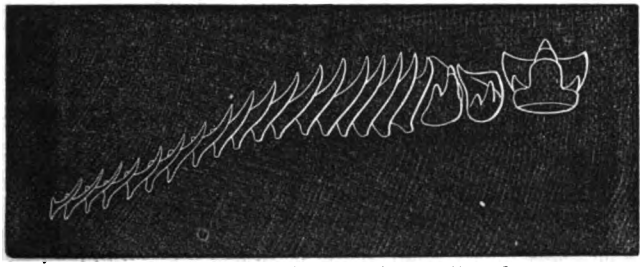
Jaw bent at either end, ends tapering, acute; anterior surface deeply channelled in its centre; concave margin smooth, with a deep, median indentation.

Fig. 60.

Jaw of *Hyalina ferrea*. [MORSE.]

Lingual membrane with 39 curving rows of 20—1—20 teeth; centrals enormously developed, very broad, tricuspid, the middle cusp very broad; two bicuspid laterals on each side, the inner much the smaller;

Fig. 61.

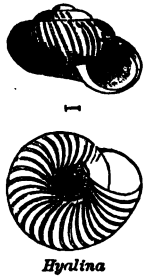


Lingual dentition of *Hyalina ferrea*. [MORSE.]

uncini thorn-shaped, similar to those of the other species of the subgenus.

Hyalina conspecta, BLAND.—Shell umbilicate, subdepressed, thin, with oblique, rather distant rib-like striæ, the interspaces microscopically striate, dark horn-colored; spire convex, with smooth, obtuse apex; suture deep; whirls four, convex, gradually increasing, the last broader, rounded, slightly descending above; umbilicus about equal to two-sevenths the diameter of the shell; aperture oblique, roundly lunate; peristome simple, straight, the margins approaching, the columellar margin scarcely dilated. Greater diam. 2, lesser 1¾; height 1 mill.

Fig. 62.



Hyalina conspecta.

Helix conspecta, BLAND, Ann. N. Y. Lyc. VIII, 163, f. 7 (Nov. 1865).

Pseudohyalina conspecta, TRYON, Am. Journ. Conch. II, 265, pl. iv, f. 58 (1866).

San Francisco and Monterey, Cal.

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H. conspecta differs from *Helix asteriscus* in having an elevated spire and a smaller umbilicus. The rib-like striæ are more numerous, but scarcely raised above the surface of the shell, which, under the microscope, is very similar to that of *H. asteriscus*.

Hyalina exigua also has very prominent ribs, but they are independent of the striæ of growth and run obliquely to them.

Hyalina exigua, STIMPSON.—Shell broadly umbilicated, depressed, pellucid, greenish horn-color, marked with delicate revolving lines, and distant longitudinal ribs obliquely decussating the incremental striæ; spire scarcely elevated, apex free from striæ; whirls three and one-half, convex, the last rounded, widely umbilicated below; aperture oblique, transversely rounded, remote from the axis; peristome simple, acute, its columellar extremity not reflected. Greater diam. 2½, height ½ mill.

Fig. 63.

Hyalina exigua, enlarged.

Helix exigua, STIMPSON, Proc. Bost. Soc. III, 175 (1850).—GOULD, T. M. III, 16.—W. G. BINNEY, T. M. IV, 102, pl. lxxvii, f. 19.—PFEIFFER, Mon. Hel. Viv. III, 102.—MORSE, Amer. Nat. I, 543, f. 34 (1867).

Helix annulata, CASE in Sill. Journ. [2] 1847, III, 101, f. 1–3; Ann. and Mag. Nat. Hist. 1847, 338, preoc.—PFEIFFER, Mon. III, 103.

Helix striatella, junior, teste GOULD, Sill. Journ. III, 276 (1847).

Pseudohyalina exigua, MORSE, Journ. Portl. Soc. I, 16, pl. ii, f. 8; pl. vii, f. 33 (1864).—TRYON, Am. Journ. Conch. II, 265, pl. iv, f. 57 (1866).

Fig. 64.

Surface of *Hyalina exigua*.

Canada, New York, and New England; Tawas Bay, Mich.

Fig. 64 shows the peculiar sculpturing of this species.

The lingual membrane has 69 rows of 16—1—16 teeth each; centrals with one long, slender, and two short cusps; laterals of same shape, but bicuspid; uncini thorn-like, aculeate, recurved, diminishing greatly in size as they pass off laterally.

Fig. 65.

Lingual dentition of *Hyalina exigua*. [MORSE.]

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Hyalina breweri, Newcomb. — Shell umbilicated, depressed, smooth, shining, surface unbroken by the wrinkles of growth, very light horn-color; spire scarcely elevated; whirls four, flattened, the last depressed, shelving towards its base; umbilicus moderate; aperture transversely lunar; peristome simple, acute. Greater diam. 5, height 2½ mill.

Fig. 66.

Hyalina breweri.

Helix breweri, Newcomb, Proc. Cal. Acad. Nat. Sci. III, 118 (1864).

Hyalina breweri, Tryon, Am. Journ. Conch. II, 250, pl. iv, f. 27 (1866).

Near Lake Tahoe, California.

My figure is drawn from an authentic specimen.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9351	1	.....	Dr. J. G. Cooper.	Type figured.

Hyalina chersinella, Dall.—Shell narrowly umbilicated, depressed, transparent, lightest horn-color, shining, with distant incremental wrinkles; spire slightly elevated; whirls four, scarcely convex, the last depressed-globose; umbilicus narrow, pervious; aperture oblique, lunately-subcircular; peristome simple, acute. Greater diam. 3, height 1 mill.

Fig. 67.

Hyalina chersinella.

Helix (Conulus) chersinella, Dall, Am. Journ. Conch. II, 328, pl. xxi, fig.

Conulus chersinella, Tryon, Am. Journ. Conch. III, 162, pl. xi, f. 33–35 (1867).

"Big Trees," Calaveras County, California.

The description and figure are drawn from an authentic specimen.

Subgenus **MESOMPHIX**, Raf.

Shell umbilicated or perforated, globosely-depressed, thin, striated, reddish horn-color, lighter below, shining; whirls 4½–6; aperture lunar ovate; peristome simple, straight, acute, extremities approaching, that of the columella subreflexed.

Fig. 68.

Animal of *Hyalina ligera.*

Animal (of *H. ligera*) uniform blackish slate-color over the whole upper

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surface, paler on the posterior extremity and base; collar grayish-white; foot narrow, exceeding in length twice the transverse diameter of the shell; eye-peduncles long and slender.

Hyalina intertexta, BINNEY.—Shell perforated, subpyramidal; epidermis yellowish horn-color; whirls six to seven, with numerous fine, oblique striæ, and very minute, spiral striæ, intersecting each other; outer whirl with a narrow, light-colored band, and an ill-defined, brownish band below it; aperture rounded, a little transverse; peristome thin, somewhat thickened within by a deposition of testaceous matter, its columellar extremity slightly reflected at its junction with the base of the shell; perforation small, sometimes nearly obsolete; base whiter than the upper surface. Greater diam. 15, lesser 13½; height 10 mill.

Fig. 69.

Hyalina intertexta.

Helix intertexta, BINNEY, Bost. Journ. Nat. Hist. III, 413, pl. xx, f. 2 (1840); Terr. Moll. II, 206, pl. xxxvi.—PHILIPPI, Icon. II, 9, p. 5, pl. vi, f. 16.—CHEMNITZ, 2d ed. I, 208, pl. xxxiii, f. 8–10.—PFEIFFER, Mon. Hel. Viv. I, 49.—REEVE, Con. Icon. 668 (1852).—LEIDY, T. M. U. S. I, 257, pl. xii, f. 1–3 (1851), anat.—DEKAY, N. Y. Moll. 38, pl. iii, f. 29 (1843).—W. G. BINNEY, T. M. IV, 96.

Mesomphix intertexta, TRYON, Am. Journ. Conch. II, 254, pl. iv, f. 33 (1866).

New York to Indiana; Tennessee to Georgia; also found in the postpleiocene beds in the Mississippi Valley.

The specimen figured is unusually large. There is a smaller, strongly carinated variety with a short, conical spire.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8675	3	.....	W. G. Binney	Cab. series.
8755	5	.....	.....	.....
8769	3	Sharon Springs, N. Y.	W. Stimpson.	.....
8782	6	.....	.....	.....

Hyalina ligera, SAY.—Shell perforated, orbicularly-convex; epidermis yellowish horn-color, shining; whirls seven, finely and thickly striated transversely, smooth below; suture not much impressed; aperture semilunate, rounded; peristome thin, acute; base and side of the outer whirl, within the aperture, thickened and white; perforation very small; umbilical region impressed. Greater diam. 15, lesser 13; height 10 mill.

Fig. 70.

Hyalina ligera.

Helix ligera, SAY, Journ. Acad. II, 157 (1821); BINNEY'S

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ed. 19.—Binney, Bost. Journ. Nat. Hist. III, 412, pl. xx, f. 1 (1840); Terr. Moll. II, 204, pl. xxxv.—Leidy, T. M. U. S. I, 257, pl. xii, f. 4–7 (1851), anat.—DeKay, N. Y. Moll. 40, excl. fig.? (1843).—Chemnitz, 2d ed. I, 108, pl. xxxiii, f. 5–7.—Desmayes in Fer. I, 184.—Pfeiffer, Mon. Hel. Viv. I, 48.—Reeve, Con. Icon. 493 (1852).—W. G. Binney, Terr. Moll. IV, 95.

Helix rafinesquea, Ferussac, Tab. Syst. 50; Hist. pl. li, a, fig. 5; pl. l, a, f. 4, 5?—Pfeiffer, Symb. I, 39.

Helix wardiana, Lea, Trans. Am. Phil. VI, 67, pl. xxiii, f. 82; Obs. II, 67 (1839).—Troschel, Arch. f. Nat. 1839, II, 221.—DeKay, N. Y. Moll. 46.

Mesomphix ligera, Tryon, Am. Journ. Conch. II, 255, pl. iv, f. 34 (1866).

From Arkansas and Georgia to the Great Lakes; north of Maryland it does not appear east of the Appalachian chain. It is also found fossil in the postpleiocene of the Mississippi Valley.

Jaw (see Terr. Moll. I, pl. xii, f. 7) strongly arcuate, ends rounded; anterior surface striated; concave margin with a well-developed median projection.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7939	2	Marietta, O.	W. Holden.	.....
5584	7	.....	W. G. Binney.	Cab. series.

Hyalina demissa, Binney.—Shell perforated, depressed-convex; epidermis yellowish horn-color, shining; whirls six, with minute lines of growth; spire obtuse; suture impressed; body-whirl expanding very little towards the aperture; aperture transverse, not large, slightly oblique; a white, testaceous deposit within; peristome thin, acute; base rather flat, smooth; perforation very small; umbilical region a little impressed. Greater diam. 11½, lesser 10½; height 6 mill.

Fig. 71.

Hyalina demissa.

Helix demissa, Binney, Bost. Journ. Nat. Hist. IV, 361, pl. xvi, f. 16 (1843); Terr. Moll. II, 232, pl. xlii, f. 1.—Pfeiffer, Mon. Hel. Viv. I, 58; IV, 48.—Reeve, Con. Icon. no. 1491.—W. G. Binney, Terr. Moll. IV, 116.

Mesomphix demissa, Tryon, Am. Journ. Conch. II, 255, pl. iv, f. 35 (1866).

Western Pennsylvania, North Carolina, Georgia, Tennessee, Alabama, and Arkansas.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8674	1	Alabama.	W. G. Binney.	Cab. series.
8833	1	Eastern Georgia.	Dr. Jones.	.....
9065		Hot Spr., Ark.	Dr. B. Powell.	.....

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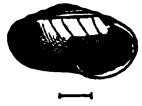
Hyalina capsella, GOULD.—Shell quite small, planorboid, pellucid, glistening, amber-colored; spire nearly plane, composed of about six and a half, closely revolving, flattened whirls; surface with distant, impressed, radiating striæ; suture margined; aperture narrow, semilunar; peristome simple, not thickened by callus within; base perforated by a deep, rather small, funnel-shaped umbilicus. Greater diam. 5, height 2½ mill.

Fig. 72.



Hyalina capsella.

Helix rotula, GOULD, Proc. Bost. Soc. III, 38 (June, 1848).—PFEIFFER, Mon. Hel. III, 107, precoc.

Helix placentula, SHUTTLEWORTH, Bern. Mit. 1852, 194.—GOULD in Terr. Moll. III, 19.—PFEIFFER, Mon. III, 631.

Helix capsella, GOULD in Terr. Moll. II, 239, pl. xxix, a, f. 1.—W. G. BINNEY, Terr. Moll. IV, 117.

Hyalina capsella, TRYON, Am. Journ. Conch. II, 252, pl. iii, f. 20 (1866).

Mountains of eastern Tennessee.

SUBGENUS **CONULUS**, (Fitz.) Moq.-Tand.

Shell imperforate, or very narrowly perforate, turbinate, arctispiral; whirls 5–6, rather convex; aperture depressed-lunar, the penultimate whirl strongly excided, somewhat oblique. Peristome with margins separated.

Animal (of *H. fulva*) bluish-black upon the head, neck, and eye-peduncles, lighter on the sides and base; foot very narrow, thread-like.

Hyalina fulva, DRAPARNAUD.—Shell imperforate, sub-conical, thin, pellucid; epidermis smooth, shining, minutely striated, amber-colored; whirls five or six, rounded, very narrow; suture distinct and deep; aperture transverse, narrow; peristome simple, acute; base convex; umbilical region indented, umbilicus closed. Greater diam. 4, lesser 3½; height 3 mill.

Fig. 73.

Hyalina fulva, enlarged.

Helix chersina, SAY, Journ. Phila. Acad. II, 156 (1821); BINNEY's ed. 18, 81.—BINNEY, Bost. Journ. Nat. Hist. III, 416, pl. xxvi, f. 3 (1840); Terr. Moll. II, 243, pl. xvii, f. 4.—GOULD, Invertebrata, 185, f. 105 (1841).—ADAMS, Vermont Mollusca, 162 (1842); Sillim. Journ. [1] XL, 273.—DEKAY, N. Y. Moll. 44, pl. xxxv, f. 338 (1843).—W. G. BINNEY, Terr. Moll. IV, 119.—MORSE, Amer. Nat. I, 544, f. 38 (1867).

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Helix egena, Say, Journ. Phila. Acad. V, 120 (1825); Binney's ed. 30.—DeKay, N. Y. Moll. 45 (1843).—Chemnitz, ed. 2, I, 237, pl. xxx, f. 19–21? (1846).—Reeve, Con. Icon. no. 1263 (1854).—Pfeiffer, Mon. Hel. Viv. I, 31, not of Gould in Terr. Moll.

Helix fulva, Draparnaud, teste Mighels (Bost. Journ. IV, 333), Chemnitz, Pfeiffer (Mon. H. I, 80), Reeve, Forbes and Hanley.

Conulus chersinus, Morse, Journ. Portl. Soc. I, 19, f. 44, 46, pl. ii, f. 4; pl. vii, f. 45 (1864).

Conulus chersina, Tryon, Am. Journ. Conch. II, 256, pl. iv, f. 37 (1866).

Common to the boreal regions of the three continents. It appears to inhabit all of eastern North America, having been found from Great Slave Lake to Texas and Florida. Dr. Newcomb catalogues it among the species found at Lake Tahoe, California.

Fig. 74.

Jaw of *Hyalina chersina*. [Morse.]

Jaw arcuate, ends attenuated; anterior surface smooth; concave margin smooth, with an obtuse median projection.

Lingual membrane with 80 rows of 37 teeth each (18—1—18); centrals with a long median and very short lateral cusps; laterals of the same shape, but bicuspid; uncini aculeate, bifurcate.

Fig. 75.

Lingual dentition of *Hyalina chersina*. [Morse.]

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7915	1	10 m. bel. Ft. Berthold.	.....	.....
8605	2	New York.	W. G. Binney.	Cab. series.
8785	6	Massachusetts.	W. Stimpson.	.....
9081	5	British America.	R. Kennicott.	.....
9085	1	English River.	"	.....
9333		Lake Tahoe, Cal.	J. G. Cooper.	.....

Hyalina fabricii, Beck.—Shell subimperforate, conical, thin, lightly striated, pellucid, reddish; spire conical, rather acute; suture profound; whirls six, convex, narrow, the last wider, rather convex at base, impressed at the centre; aperture vertical, widely lunar; peristome simple, acute, its columellar extremity reflected above, simulating a perforation. Greater diam. 4, lesser 3½; height 3 mill.

Fig. 76.

Hyalina fabricii.

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Helix fabricii, Beck, Ind. 21, no descr.—Möller, Ind. Moll. Gr. 4 (1842) —Pfeiffer, Zeit. f. Mal. 1848, V, 90; Mon. Hel. Viv. III, 32.—Reeve, Con. Icon. no. 1459.—W. G. Binney, T. M. U. S. IV, 120, pl. lxxvii, f. 17.

Helix hammonis, Strøm. Trondh. selsk. skrift. III, 425, pl. iv, f. 16.

Helix nitida, Fabricius, Fauna Gr. 389.

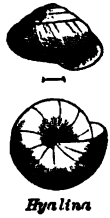
Conulus fabricii, Mörch, Nat. Bidr. af Gr. 75 (no descr.).—Tryon, Am. Journ. Conch. II, 256, pl. iv, f. 38 (1866).

Greenland.

Fig. 76 is copied from Reeve.

Hyalina gundlachi, Pfeiffer. — Shell perforated, depressed-conic, rather solid, pale rusty-brown, striated with numerous, faint lines of growth; spire elevated, having about five closely revolving, well rounded whirls, separated by a very deep suture; periphery rounded; base convexly rounded, and excavated around a small, deep perforation; aperture nearly circular, interrupted for a short space by the penultimate whirl; peristome simple, slightly expanded, and at the columellar region decidedly reflexed. Greater diam. 2¼, lesser 2¼; height 1⅝ mill.

Fig. 77.



Hyalina gundlachi.

Helix gundlachi, Pfeiffer, Wiegm. Arch. 1840, I, 250; Mon. Hel. Viv. I, 50; in Chemnitz, ed. 2, I, 239, pl. xxx, f. 25–28.—W. G. Binney, Terr. Moll. IV, 121.

Helix pusilla, Pfeiffer, Arch. f. Nat. 1839, I, 351, nec Lowe.

Helix egena, Gould in Terr. Moll. II, 245, pl. xxii, a, f. 3, not of Say.

Conulus gundlachi, Tryon, Am. Journ. Conch. II, 256, pl. iv, f. 64 (1866).

Florida. Also in Cuba and St. Thomas, Porto Rico, Viéque.

Subgenus **GASTRODONTA**, Albers.

Shell subperforate or umbilicated, orbicularly depressed, light horn-color, sometimes glassy, with more or less numerous wrinkle-like striæ; whirls 5–7; aperture lunate, its base generally furnished with fold-like denticles not reaching its margin; peristome simple, acute.

Animal without a caudal mucus pore. That of *H. interna*, with head, neck, and eye-peduncles bluish-black, or slate-color; margin and posterior part of foot white. Eye-peduncles very long, tentacles very short; body narrow and delicate, in length not much exceeding the diameter of the shell.

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Hyalina lasmodon, PHILLIPS.—Shell very much flattened above, a little convex; epidermis corneous, shining; whirls seven, narrow, very slowly increasing in diameter from the apex to the aperture, and not expanding at the aperture, with minute, transverse striæ and wrinkles; suture moderately impressed; peristome thin, acute; aperture nearly circular, within, upon the base, are two prominent, white, testaceous laminæ, nearly parallel, and extending far into the cavity of the whirl; umbilicus large, rather expanded, and deep; base smooth, well rounded from the umbilicus to the circumference. Greatest diam. 6, height 2½ mill.

Fig. 78.

Hyalina lasmodon.

Helix lasmodon, PHILLIPS, Journ. Acad. Nat. Sci. VIII, 182 (1842); Proc. of same, I, 28 (1841).—BINNEY, Terr. Moll. II, 254, pl. xxxvii, f. 2.—DEKAY, N. Y. Moll. 47 (1843).—PFEIFFER, Mon. Hel. Viv. III, 142.—W. G. BINNEY, Terr. Moll. IV, 122.

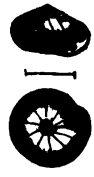
Helix macilenta, SHUTTLEWORTH, Bern. Mit. 1852, 195.—GOULD, Terr. Moll. III, 20.—PFEIFFER, *l. c.* III, 640.

Gastrodonta lasmodon, TRYON, Am. Journ. Conch. II, 257, pl. iv, f. 40 (1866).

In the mountains of northern Alabama and eastern Tennessee.

Hyalina interna, SAY.—Shell very narrowly perforated, depressed, slightly convex; epidermis reddish-brown, shining; whirls eight, with regular, equidistant, elevated, oblique, rounded ribs, separated by distinct grooves; suture deeply impressed; aperture flattened, transverse, narrow; peristome thin, acute, thickened internally; within the base of the aperture, somewhat distant from the margin, are two prominent, sub-lamelliform, white teeth, not reaching the edge of the peristome; base smooth, polished, umbilical region indented. Greater diam. 5¼, height 3½ mill.

Fig. 79.



Hyalina interna.

Helix interna, SAY, Journ. Acad. II, 155 (1822); BINNEY'S ed. 18.—BINNEY, Bost. Journ. Nat. Hist. III, 405, pl. xxi, f. 1 (1840); Terr. Moll. II, 247, pl. xxx, f. 4.—DEKAY, N. Y. Moll. 46 (1843).—CHEMNITZ, 2d ed. I, 200, tab. ci, f. 1–4.—PFEIFFER, Mon. Hel. Viv. I, 183.—REEVE, Con. Icon. 718.—W. G. BINNEY, Ter. Moll. IV, 121.

Helix pomum-adami, GREEN, DOUGHTY'S Cab. III, 35 (1834).

Gastrodonta interna, TRYON, Am. Journ. Conch. II, 258, pl. iv, f. 42 (1866).

From the Alleghany Mountains to Missouri; Ohio to Georgia.

The teeth within the aperture are in general formed of a single prominent lamina, or tooth-like fold; but sometimes one, or both of them, are bifid, or even trifid. A second set often, and sometimes a third set of teeth are seen through the transparent base of the shell, irregularly striated, but generally having equal

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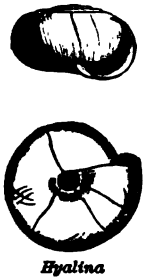
spaces between each two sets. They are apparent in the youngest as well as in the oldest specimens, and continue to be formed from time to time, so long as the shell increases in size. They probably mark regular periods of growth.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8040	5	Columbus, Ga.	Dr. J. Lewis.	.....
8607	4	Georgia.	W. G. Binney.	Cab. series.
8784	20	.....	.....	.....
8785	1	Ohio.	.....	Cab series.
8786	2	"	.....	.....
8788	4	.....	.....	.....

Hyalina multidentata, BINNEY.—Shell umbilicated, depressed, sub-planulate above, very thin, pellucid; epidermis smooth, shining; whirls six, narrow, slightly convex, increasing but slowly in diameter, delicately striated, beneath smoother; suture impressed; aperture semi-lunate, narrow; peristome acute; umbilicus very small, rounded, pervious; base convex, indented around the umbilicus; two or more rows of very minute, white teeth, radiating from the umbilicus, are seen through the shell, within the base of the last whirl. Greater diameter 3¼, lesser 3; height 1½ mill.

Fig. 80.



Hyalina multidentata, enlarged.

Helix multidentata, BINNEY, Bost. Journ. Nat. Hist. III, 425, pl. xxii, f. 5 (1840); Terr. Moll. II, 258, pl. xlviii, f. 3.—ADAMS, Vermont Mollusca, 161 (1842).—CHEMNITZ, 2d ed. II, 201, pl. ci, f. 9-12.—PFEIFFER, Mon. Helic. Viv. I, 184.—W. G. BINNEY, Terr. Moll. IV, 123.—REEVE, Con. Icon. no. 729.—MORSE, Amer. Nat. I, 543, f. 33 (1867).

Hyalina multidentata, MORSE, Journ. Portl. Soc. I, 15, f. 31, p. 61, f. 30; pl. vi, f. 32 (1864).

Gastrodonta multidentata, TRYON, Am. Journ. Conch. II, 258, pl. iv, f. 43 (1866).

Maine, Vermont, New York, Ohio; also Lower Canada.

There are from two to four rows of very minute, delicate, white teeth, on the lower side of the interior of the last whirl, radiating from the centre. One row is usually so near the aperture as to be seen within it with the aid of a microscope; the others are more or less remote: each row contains from five to six distinct teeth. They are visible through the shell.

Jaw arcuate, broad in centre, greatly attenuated and blunt at

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ends; anterior surface with a few central striæ; concave margin smooth, with a slight median projection.

Fig. 81.

Jaw of *Hyalina multidentata*. [MORSE.]

Lingual membrane with 68 rows of 15—1—15 teeth each; centrals with one very long and two small cusps; laterals of same shape, but bicuspid; uncini acute, recurved, thorn-shaped, greatly modified in size as they pass off laterally.

Fig. 82.

Lingual dentition of *Hyalina multidentata*. [MORSE.]

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9139	1	Vermont.	Dr. Stimpson.	.....

Hyalina significans, BLAND.—Shell umbilicate, depressed, discoidal, thin, with fine irregular striæ, which are almost obsolete at the base, shining, pale horn-colored; spire little elevated; suture slightly impressed; whirls six, subplanulate, the last roundly inflated, rather flat at the base, excavated around the umbilicus, which is pervious, and equal almost to one-fifth of the diameter of the shell; aperture oblique, depressed, lunate; peristome simple, acute. Greater diam. 4½, lesser 4; height 2 mill.

Fig. 83.

Hyalina significans.

Helix significans, BLAND, Am. Journ. Conch. II, No. 4, p. 372, pl. xxi, f. 9 (1866).

Gastrodonta significans, TRYON, Am. Journ. Conch. II, 163, pl. xi, f. 39–41 (1866).

Fort Gibson, Indian Territory.

In a young specimen of *H. significans*, having four whirls only, there are three small teeth, one by itself, and at some distance from it, two others, situated as the teeth are in *H. multidentata*. Whether these teeth are or not constant in the antepenultimate whirl of *H. significans*, I am unable to determine. (*Bland.*)

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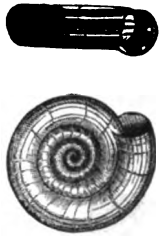
Hyalina[1] **[?] lineata,** Say.—Shell widely umbilicated, discoidal; epidermis greenish; whirls about four, visible on the base of the shell as well as above, with numerous equidistant, parallel, raised lines revolving upon them; suture much impressed; aperture remote from the axis, semi-lunate, narrow, not expanding; peristome acute, thin; umbilicus wide, forming a concave depression of the base, each volution visible to the apex; within the aperture, on the external circumference, are placed from one to three pairs of minute, conical, white teeth, the first pair in sight when looking into the aperture, the others more remote. Greater diam. 3½, lesser 3; height 1½ mill.

Fig. 84.



Hyalina lineata, enlarged.

Helix lineata, Say, Journ. Phila. Acad. I, 18 (1817); II, 273 (1824); Nich. Encycl. 3d ed. IV (1819); Binney's ed. 7, 24.—Binney, Bost. Journ. Nat. Hist. III, 436, pl. xxii, f. 6 (1840); Terr. Moll. II, 261, pl. xlviii, f. 1.—DeKay, N. Y. Moll. 44 (1843).—Gould, Invert. 179, f. 103 (1841).—Adams, Vermont Mollusca, 161 (1842).—Ferussac, Tab. Syst. 44; Hist. pl. lxxix, f. 1.—Deshayes in Fer. I, 80.—Chemnitz, 2d ed. II, 203, tab. ci, f. 13–15.—Pfeiffer, Mon. Hel. Viv. I, 184.—Reeve, Con. Icon. 724 (1852).—W. G. Binney, Terr. Moll. IV, 123.—Morse, Amer. Nat. I, 546, f. 44 (1867).

Planorbis parallelus, Say (?), Proc. Acad. Nat. Sci. II, 164 (1821); ed. Binney, 63.

Helicodiscus lineata, Morse, Journ. Portl. Soc. I, 25, f. 61, 62, pl. ii, f. 3; pl. viii, f. 63(1864).—Tryon, Am. Journ. Conch. II, 264, pl. iv, f. 60(1866).

Inhabits all of eastern North America, having been found from Gaspé to Texas. Also on the Rio Chama, New Mexico.

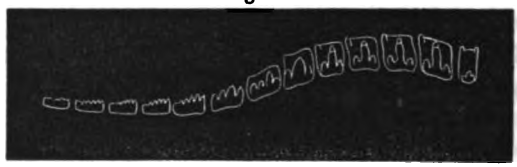
Fig. 85.

Jaw of *Hyalina lineata*. [Morse.]

Jaw narrow, long, crescentic, ends pointed; anterior surface with striæ converging to the acute median projection of the smooth concave margin.

Lingual membrane with 77 curving rows of 12—1—12 teeth

Fig. 86.



Lingual dentition of *Hyalina lineata*. [Morse.]

[1] Morse proposes the generic name *Helicodiscus* for this species, which I have placed doubtfully in *Hyalina*.

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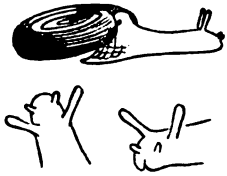
each; centrals very small, short, obtusely tricuspid; laterals large, with one central, long, and two side, short cusps; uncini denticulated or serrate.

Animal nearly white or rather translucent, mottled with small white blotches; body long and narrow; upper posterior portion of foot conspicuously furrowed. In motion the shell lies perfectly flat on the extreme posterior portion of body, the eye-peduncles standing nearly perpendicularly, and the head with tentacles thrust out some way beyond the base of eye-peduncles; eyes scarcely visible; animal very short posteriorly.

Fig. 87.



Animal of *Hyalina lineata*, enlarged. [Morse.]

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7906	8	Massachusetts.	W. Stimpson.	.....
7907	1	Washington, D. C.	"	.....
9031	10	Milwaukee, Wis.	I. A. Lapham.	.....
8625	2	Georgia.	W. G. Binney.	Cab. series.

MACROCYCLIS, Beck.

Shell thin, widely umbilicated, depressed, striate or wrinkled, color uniform; whirls 4½–5, the last broad, depressed, moderately deflexed in front; aperture obliquely ovate; peristome somewhat thickened or expanded, the margins approximating, the basal shortly reflexed.

Fig. 88.

Animal of *Macrocyclis concava*.

Animal (of *M. concava*): upper surface grayish, eye-peduncles long, slender, bluish, base dirty-white, color reddish-orange, posterior extremity slightly tinged with the same; foot narrow, twice as long as the diameter of the shell, tail-pointed, scarcely reaching behind the shell; other characters as in *Helix*. Carnivorous.

Fig. 89.

Jaw of *Macrocyclis vancouverensis*.

Jaw crescentic, ends sharply pointed, anterior surface striated; concave margin smooth, with a median projection.

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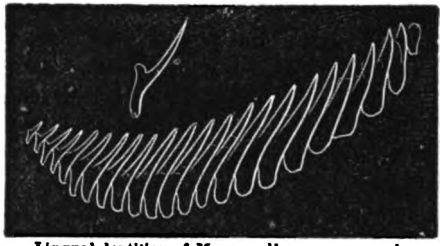
Lingual membrane with numerous arched rows of aculeate, recurved, thorn-like uncini; centrals simple, conical, pointed; laterals wanting.

Fig. 90.



Lingual dentition of *Macrocyclis vancouverensis*.

Macrocyclis vancouverensis, LEA.—Shell widely umbilicated, depressed, very slightly convex on the upper surface; epidermis light greenish-yellow; whirls five, nearly flat above, protuberant and rounded on the lower surface, lines of growth very minute, with crowded, microscopic revolving striæ, the outer whirl expanding a little towards the aperture; umbilicus wide and deep; aperture transverse, somewhat rounded, flattened above by a depression of the peristome near its junction with the body-whirl, its edge tinged with rufous; peristome thin, acute, slightly reflected at the base of the shell, simple above, the two extremities approaching each other, and connected by a thin callus, which covers the columella. Greater diam. 31, lesser 26; height 14 mill.

Fig. 91.

Macrocyclis vancouverensis.

Helix concava, BINNEY, Bost. Journ. Nat. Hist. III, 372, pl. xiv (1840), not of SAY.

Helix vancouverensis, LEA, Am. Phil. Trans. VI, 87, pl. xxiii, f. 72; Obs. II, 87 (1839).—TROSCHEL, Arch. f. Nat. 1839, II, 21.—DEKAY, N. Y. Moll. 45 (1843).—PFEIFFER, Symbolæ, II, 41; Mon. Hel. Viv. I, 200; in CHEMNITZ, ed. 2, II, 146, pl. xciv, f. 21–23.—BINNEY, Terr. Moll. II, 166, pl. xx.—W. G. BINNEY, Terr. Moll. IV, 19.—GOULD, U. S. Expl. Ex. 36, f. 37 (1852).—REEVE, Con. Icon. no. 669 (1852).

Helix vellicata, FORBES, Proc. Zool. Soc. Lond. Mar. 1850, 75, pl. ix, f. 1.—CHEMNITZ, ed. 2, II, 454, pl. cliv, f. 42–44.—REEVE, Con. Icon. no. 673 (1852).—PFEIFFER, Mon. Hel. Viv. III, 155.

Macrocyclis vancouverensis, TRYON, Am. Journ. Conch. II, 245, pl. iii, f. 6 (1866).

A west coast species, from lat. 56°, at Sitcha in Russian America, to lat. 37° (*Newcomb*). Idaho (*Cooper*).

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The species is very nearly allied to *M. concava*. The differences observable are the following: the size of this shell greatly exceeds the latter in all its proportions, its transverse diameter being nearly twice as great. This difference is not caused by an increased number of whirls, for the number in both is precisely the same; but this shell seems to be projected originally upon a larger scale, the nucleus being as much larger as mature specimens. The color is much more yellow. The umbilicus is not so widely expanded, and does not admit of counting all the whirls; and the whirls seem to be more voluminous. The striæ of growth are usually coarser, and the microscopic revolving striæ are stronger and much more constantly present.

It also strongly resembles *M. sportella*, but in that species the revolving lines usually merely cut the summits of the radiating striæ, without being continuous over the whole surface.

Fig. 92.

Jaw of *Macrocyclis vancouverensis*.

Jaw crescentic, ends sharply pointed; anterior surface ridged; concave margin smooth, with a median projection.

Lingual membrane with 35 arched rows of 43 teeth each (21—1—21); centrals small, ——?; laterals none; uncini long,

Fig. 93.

Lingual dentition of *Macrocyclis vancouverensis*.

narrow, aculeate, recurved, thorn-like, greatly modified in size as they pass off laterally.

Animal short posteriorly, subcylindrical, very light colored, giving a straw-colored reflection, sides pearly, marked with longitudinal lines of coarse, elongated, squamose granules, about eight or ten on each side.

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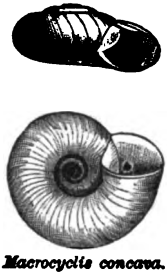
Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8354	7	.....	Com. Wilkes.	.....
8355	3	Oregon City.	.....	.....
8356	4	Oregon.	Com. Wilkes.	.....
8357	3	Columbia River.	"	Young.
8358	10	.....	"	.....
8451	7	California.	Lt. W. P. Trowbridge.	In alcohol with animal.
8452	4	Puget Sound.	Com. Wilkes.	" "
8453	3	Columbia River.	"	" "
8469	2	Chilloweyuck Depot. Puget Sound.	A. Campbell.	" "
8546	4	.....	.....	Cab. series.
9206	1	St. Joseph River, second camp, int. Oregon.	.....	.....
9319	2	E. of Ft. Colville, W. T.	N. W. Boundary Surv.	.....

Macrocyclis concava, Say.—Shell depressed, very slightly convex on the upper surface; epidermis whitish horn-color, sometimes with a tinge of green; whirls five, above flattened, below rounded, finely striate obliquely, and sometimes with microscopic revolving lines; the outer whirl spreading a little towards the aperture; suture rather deeply impressed; umbilicus wide, deep, exhibiting all the volutions to the apex; aperture rounded, somewhat flattened above, its edge frequently tinged with reddish-brown; peristome sub-reflected at its columellar extremity, simple above, and in some specimens considerably depressed near its junction with the outer whirl; columella with a thin callus, the edge of which connects the upper and lower extremities of the peristome. Greater diam. 21, lesser 16; height 7 mill.

Fig. 94.



Macrocyclis concava.

Helix concava, Say, Journ. Acad. II, 159 (1821); Binney's ed. 20.—Binney, Bost. Journ. Nat. Hist. III, 372 (1840), excl. pl.; Terr. Moll. II, 163, pl. xxi.—Adams, Vermont Mollusca, 159 (1842), excl. syn. *vancouverensis.*—DeKay, N. Y. Moll. 33, pl. ii, f. 15 (1843).—Pfeiffer, Mon. Hel. Viv. IV, 159.—W. G. Binney, Terr. Moll. IV, 63.—Leidy, T. M. U. S. I, 258, pl. xii, f. 9–11 (1851), anat.—Morse, Amer. Nat. I, 412, f. 26, 27 (1867).

Helix planorboides, Ferussac, Hist. Nat. des Moll. tab. lxxxii, f. 4.—Pfeiffer, Mon. Hel. Viv. I, 200; Symbolæ, II, 37.—Chemnitz, ed. 2, II, 164, pl. xcv, f. 17–19; pl. cliv, f. 45 (1851).—Reeve, Con. Icon. 674 (1852).—Deshayes in Fer. I, 87.

Helix dissidens, Deshayes in Fer. Hist. I, 97, pl. lxxxiv, f. 1, 2.

Macrocyclis concava, Morse, Journ. Portl. Soc. I, 12, pl. v, fig. (1864).—Tryon, Am. Journ. Conch. II, 245, pl. iii, f. 8 (1866).

Fig. 95.

Jaw of *M. concava.*

Canada to Georgia; Michigan to Missouri. Also in the postpleiocene of Mississippi Valley.

See remarks under *M. vancouverensis.*

Jaw crescentic, ends bluntly rounded; anterior sur-

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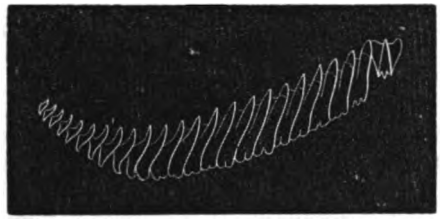
face striated; concave margin smooth, with a median projection.

Lingual membrane with — rows of 23—1—23 teeth; centrals long, slender, pointed; laterals none; uncini in a curved, trans-

Fig. 96.



Lingual dentition of *Macrocyclis concava*.

verse row, long, slender, those nearest the edge very much smaller and thorn-shaped.

The animal has been described and figured on p. 53.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7908	1	Illinois.	.....	.....
7909	1	Marietta, O.	W. Holden.	.....
7917	3	Columbus, O.	Dr. J. Lewis.	.....
8620	4	.....	W. G. Binney.	Cab. series.
8750	11	.....	W. Stimpson.	.....
9187	12	Vermont.	L. E. Chittenden.	.....

Macrocyclis sportella, Gould.—Shell much depressed, convex above, concave beneath, sloping into a broad, tunnel-shaped umbilicus; surface delicate and shining, of a pale, yellowish-green color, regularly sculptured with sharp, coarse striæ of growth, which are crossed by fine, crowded, revolving lines, which usually cut merely the summits of the radiating ridges, so that, to the naked eye, the surface appears but minutely granulated, but under a magnifier the raised spaces are seen to be well-defined squares; whirls five, separated by a deep suture, the outer one proportionally large; aperture nearly circular, a little angular at base, modified by the preceding whirl; peristome acute, simple. Greater diam. 12, height 6 mill.

Fig. 97.

Macrocyclis sportella.

Helix sportella, Gould, Proc. Bost. Soc. Nat. Hist. II, 167 (1846); Moll. Ex. Ex. 37, f. 42 (1852); T. M. II, 211, pl. xxii, a, f. 1.—W. G. Binney, Terr. Moll. IV, 19.—Pfeiffer, Mon. Hel. Viv. I, 111.—Bland, Ann. N. Y. Lyc. VII, 366; VIII, 165.

Macrocyclis sportella, Tryon, Am. Journ. Conch. II, 245, pl. iii, f. 7 (1866).

From San Diego to Puget Sound.

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See remarks under *M. vancouverensis*.

In extreme forms of this species the revolving lines mark the whole surface, even in the umbilicus and in the interstices between the incremental striæ.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8562	3	Ft. Umpqua, Or.	.....	Cab. series.
3409	1	San Diego, Cal.	Lieut. Ives.	"
8724	1	San Francisco.	Cal. Acad. Nat. Sci.	.....

Macrocyclis voyana, NEWCOMB.—Shell widely umbilicated, depressed, planorboid, thin, translucent, with delicate oblique striæ of growth, and fine revolving lines, more developed below, very light horn-color; spire scarcely elevated; whirls five, flattened, rapidly increasing, the last broad, flattened below, falling in front; umbilicus very large; aperture very oblique, removed from the axis, irregular truncatedly-ovate; peristome thickened, subreflected, flexuose, strongly depressed above and sinuate, ends approaching, connected with a stout, elevated, brownish, ridge-like callus. Greater diam. 21, lesser 18; height 4 mill.

Fig. 98.

Macrocyclis voyana.

Helix (*Macrocyclis*) *voyana*, NEWCOMB, Am. Journ. Conch. I, part 3, 235, pl. xxv, f. 4 (July, 1865).

Macrocyclis voyana, TRYON, Am. Journ. Conch. II, 246, pl. iii, f. 9 (1866).

Canyon Creek, Trinity Co., California.

The specimen figured was received from Dr. Newcomb.

LIMAX, LINN.

Body lessening towards the posterior extremity, which terminates in a point. Back with a carina or keel when contracted, convex when extended. Integuments with longitudinal elongated glands, and anastomosing furrows arranged in the same manner upon both sides. Mantle anterior, oval, marked with fine concentric striæ or prominent wrinkles, unattached and free at the front and sides, but connected with the body at its posterior part, and containing in this part a testaceous rudiment or shell. Locomotive disk not expanded at margin, having a narrow band running longitudinally along its centre and separated from the sides by a well-defined line or furrow. Respiratory orifice near

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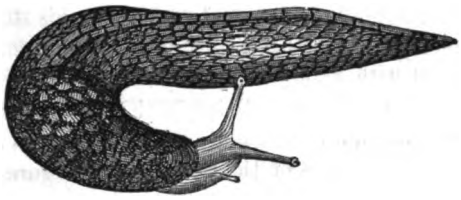
the right posterior margin of the mantle, large. Anal orifice immediately adjacent to, but a little above and anterior to the respiratory orifice, with a cleft or fissure through the mantle

Fig. 99.



Limax flavus.

from the orifice to its edge. Orifice of organs of generation near, and immediately behind, the right superior eye-peduncle.

Testaceous rudiment thin, concentrical, not spiral, covered above with a thin and transparent periostraca, below smooth.

Fig. 100.

Jaw of *Limax flavus.*

Jaw without ribs or marginal denticulations, its concave margin with a median projection.

Lingual membrane very broad, teeth long, central tricuspid, laterals of the same shape, but tricuspid; uncini aculeate.

Fig. 101.

Lingual dentition of *Limax flavus.*

Species of *Limax* have been found in every quarter of the globe, but they may be said to belong rather to the more temperate regions. In North America they are less common in the tertiary portions of the southern States, but are found abundantly in the middle and northern States and in the British possessions. Specimens were collected by Mr. Kennicott as far north as the junction of the Yukron and Porcupine Rivers in Russian America. The Pacific States also are inhabited by several undescribed species. The cellars and gardens of the cities of the Atlantic

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seaboard are infested with several European species, introduced by commerce. Like rats and mice, and various destructive insects which have proceeded from continent to continent and from island to island in the same manner, they occupy the houses and other structures, in the immediate vicinity of man, preying upon the fruits of his industry, and consuming his stores of provisions. Like them they thrive only in the vicinity of, and, as it were, in contact with man, and never withdraw from him to resume their original manner of living in the wilds. These habits are the cause of much mischief, and when the animals are numerous, render them the pests of the house and the garden. Their increase therefore, beyond a certain point, becomes prejudicial, and means are adopted to keep them in check. In various ways thousands of them are destroyed during the year, but their extraordinary fertility enables them to make the loss good and to sustain themselves in undiminished numbers.

Species of the genus found in this country can be readily confounded only with those of the genus *Arion*. They can be at once distinguished by their smooth jaw with its rostriform projection, that of *Arion* being ribbed and regularly concave; the respiratory orifice of *Limax* is on the hinder part of the shield, while in *Arion* it is on the anterior portion; the rudimentary shell of *Limax* is strong, oblong or square, while in *Arion* there are but irregular grains of calcareous matter.

There exists no confusion regarding the nomenclature and synonymy of *Limax*, though species have formerly been described under a variety of names.

The characteristics of the shield furnish points on which to base a division of the species into two subgenera—*Amalia* and *Eulimax*. In the former it has more or less prominent wrinkles, while in the latter it is regularly and concentrically striate.

Subgenus AMALIA.

Shield more or less apparently rugose, without concentric striæ.

Spurious Species of Amalia.

Limax columbianus, Gould, is the same as *Ariolimax columbianus*, Gould, *q. v.*

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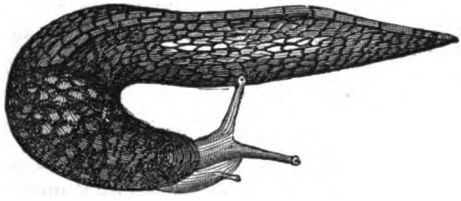
Subgenus **EULIMAX**, Moq.-Tand.

Shield with more or less distinct concentric striæ; wrinkles none, or scarcely none.

Limax flavus, Linn.—Color brownish, yellowish-brown, or ashy brown, with oblong-oval uncolored spots, which have a longitudinal disposition; mantle with rounded spots; head, neck, and eye-peduncles blue, semi-transparent; tentacles white; base of foot sallow white. Body when extended cylindrical, elongated, terminating acutely with a short but

Fig. 102.



Limax flavus.

prominent keel; upper part covered with long and narrow prominent tubercles. Mantle ample, oval, rounded at both ends, with numerous very fine concentrical striæ. Sides paler, and without spots. Respiratory foramen large, placed near the posterior lateral margin of the mantle and cleft to the edge. Generative orifice indicated by a white spot a little behind the eye-peduncle of the right side. Length, when fully extended, usually about 75 mill.; an individual kept in confinement with abundance of food attained the length of nearly 125 mill., and several others that of 200 mill.

Limax flavus, Linnæus, Syst. Nat. [X], 1758, I, p. 652 (not Müller, 1774).—Binney, Bost. Journ. Nat. Hist. IV, 164 (1842).—DeKay, N. Y. Moll. 21, pl. i, f. 5 (1843).—Gray and Pfeiffer, Reeve, &c.

Limax variegatus, Draparnaud, Tabl. Moll. 103 (1801).—Férussac, Moquin-Tandon.—Binney, Terr. Moll. II, 34, pl. lxv, f. 1 (1851).—Leidy, anatomy, T. M. I, 248, pl. i (1851).

An introduced species, noticed hitherto in Massachusetts at Boston and Cambridge; in the cities of New York, Philadelphia, and Baltimore; in Virginia at Richmond; and at the University of Virginia, and at other cities. It is also found in Europe, Syria, and Madeira.

The contrast of colors, and the elegant arrangement of the spots and lines, render this a beautiful species. The tubercles

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of the surface are very fine, and so much compressed as to appear in some lights to be carinated. There is often a well-defined row of spots down the back. The eye-peduncles are long and delicate, the mantle sometimes terminates posteriorly in an obtuse point, and the locomotive band of the foot is narrow and well defined. There is a prominent ridge on the head and neck between the eye-peduncles, and a furrow marks the edges of the foot. It is active in its motions, turns rapidly, and often bends the body so as to form two parallel lines. It does not secrete mucus so freely as *Limax agrestis*. The carina is often yellowish. The testaceous rudiment is oblong-oval, convex above and concave below, thin and membranaceous in young individuals, with the superior surface smooth and covered with a delicate periostracum, and with the lower surface uneven. No spiral arrangement is visible to the eye, and it appears to be only a thin testaceous plate, imbedded in the mantle. In old individuals it attains a greater thickness.

It inhabits cellars and gardens in moist situations, in the cities. It is considered noxious to vegetation. It feeds upon the leaves of plants in kitchen gardens, and upon the remains of the cooked vegetables, and bread, thrown out from houses. Its most common habitat is in cellars, where it makes its presence most disagreeable by attacking articles of food, and especially by insinuating itself into vessels containing meal and flour. It is common, but not so numerous as *Limax agrestis*. The young suspend themselves by a thread of mucus.

This species is of foreign origin, but the period of its introduction is not known. It was noticed by Mr. Say, more than forty years since. It is probable that it inhabits all the cities of the sea-coast, and their vicinage, and some of the cities of the interior.

Fig. 103.

Jaw of *Limax flavus*.

Jaw of a light horn-color, its anterior surface not on one plane, but projecting towards a strong median vertical carina; arcuate, ends square, striated, concave margin smooth, with a well-developed median projection. Fig. 103 represents the usual form of the jaw, which agrees with that of a foreign individual figured by Moquin-Tandon. Fig. 103 was taken from a very large individual from Massachusetts.

Fig. 104.

Jaw of *Limax flavus* [Moq.-Tand.]

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Lingual membrane very broad, of 100 rows of 85 teeth each

Fig. 105.

Lingual dentition of *Limax flavus*.

(42—1—42); teeth long, slender; centrals tricuspid, laterals tricuspid; uncini aculeate.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8665	1	Burlington, N. J.	W. G. Binney.	Cab. series.

Limax agrestis, Linn.—Color varying from whitish through every shade of cinereous and gray to black, and through various shades of yellowish, or amber-color, to brownish, and sometimes irregularly spotted with small black points or dots; eye-peduncles and tentacles darker than the general surface, sometimes black; mantle sometimes mottled with a lighter color; base of foot sallow white; sheath of eye-peduncles indicated by black lines extending backwards from their base under the edge of the mantle. Body when in motion cylindrical, elongated, terminating acutely, the sides towards its posterior extremity compressed upwards, so

Fig. 106.

Limax agrestis.

as to form a short carina or keel; foot very narrow. Mantle oblong-oval, fleshy, convex and prominent, rounded at both extremities, equalling in length one-third of the length of the body, its surface marked by prominent, irregularly waved, concentrical lines and furrows, having their centre on the posterior part, and its edges free throughout the whole circumference. Upper surface of the body marked with longitudinal lines, or shallow furrows, darker than the general surface, sometimes black, anastomosing with each other, and forming a sort of network; between the reticulated lines are narrow, irregular oblong plates, or smooth, flattened tubercles, giving the surface the appearance of a mosaic work, with lines of dark cement; reticulations less distinct on the sides, and disappearing towards the base; a prominent tuberonlar ridge extends from between the eye-peduncles backward to the mantle, with a furrow on each side. Eye-

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peduncles cylindrical, about one-eighth the length of the body, with small, black, ocular points on the superior part of the terminal bulb; tentacles immediately under, very short. Respiratory foramen near the posterior lateral edge of the mantle, large, surrounded with a whitish border. Orifice of rectum immediately adjacent, but a little above and anterior to the respiratory foramen. Foot narrow; locomotive band bounded by two distinct longitudinal furrows.

Generally about 25 mill. in length, but when fully grown nearly 50 mill.

Limax agrestis, Linnæus, Syst. Nat. [X], 1758, I, 652.—Moquin-Tandon, Reeve, &c.—Binney, Bost. Journ. Nat. Hist. IV, 166 (1842); Terr. Moll. II, 37, pl. lxiv, f. 2 (1851).—Leidy, Terr. Moll. I, 250, pl. ii, f. 7–9 (1851), anat.—DeKay, N. Y. Moll. 20, pl. i, f. 4 (1843).—Morse, Journ. Portl. Soc. I, 7, f. 1, pl. iii, f. 2 (1864).

Limax tunicata, Gould, olim, Invert. 3 (1841).

It is undoubtedly of European origin. Inhabiting Boston, New York, Philadelphia, and other maritime cities of the Atlantic coast. Also in Greenland. It is common in the neighborhood of Boston, under stones at road-sides, and about stables and farm-yards, and in other moist situations, under wet and decaying pieces of wood. It is also found in cellars and gardens, and causes some mischief by its depredations. A considerable number of individuals often congregate in the same retreat. Their food appears to be the green leaves of succulent plants, and sometimes ripe fruits; they feed during the night, and are rarely found out of their retreats in the daytime. Their growth is rapid, the animal excluded from the egg in the spring arriving at full maturity and producing eggs before the succeeding winter. They defend themselves from injurious contact by instantly secreting, at the part touched, a quantity of milky-white, glutinous mucus. They are active in their motions, and soon escape when disturbed. Suspending themselves, head downwards, they lower themselves from plants and fences by forming a mucous thread which they attach to the point from which they hang. They are occasionally seen in this situation in rainy weather. During the process of excreting the mucous thread, the alternate undulating expansions and contractions of the locomotive band of the foot are seen to take place, in the same manner as when they are in motion on a plane surface.

This species is much more prolific than the others, the number of eggs deposited during the year being sometimes several hundred; its numbers, in favorable localities, are therefore very

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great. It begins to lay its eggs early in the spring, and continues, with intervals, until checked by the cold of approaching winter. The last deposit of them often remains in the soil until the succeeding spring, when they are hatched with the first generation of the year. The eggs are semi-transparent, and nearly globular. They produce young in about twenty days after they have been deposited.

M. Bouchard-Chantereaux has observed them to deposit eggs in sixty-six days after their own birth, and to attain their full size in eighty-two days.

This species varies very much in color, and the descriptions by different authors being drawn principally from it, differ greatly from each other; but whatever may be the color, the peculiar character of the furrows and the tubercles remains constant. In a state of contraction, the back is arched, the head is entirely withdrawn under the mantle, the glands of the skin are very prominent, making the surface appear rough, the carina is more apparent, and the posterior extremity, being a little turned to one side, appears to be oblique. It is described by some authors as constantly oblique, but the obliquity disappears when the animal is fully extended. When in motion, the head extends considerably beyond the mantle, and there is an interval between its margin, and the base of the superior tentacle, equal to the length of the tentacles. The mantle adheres to the body by its posterior central portion, and it is in this part of it that is found imbedded the testaceous rudiment, or shell. This is oval, curved above, very thin and delicate, having a transparent epidermis. At its posterior part there is a slight apical prominence, and the appearance of indistinct concentric lines of growth.

There is no considerable variation in the species except in regard to color, which varies almost infinitely.

Fig. 107.

Jaw of *Limax agrestis.*

Jaw (according to Moquin-Tandon) arcuate, ends and median projection blunt; vertical middle carina light horn-color.

The figure of the lingual dentition of this species given by Morse (Portland Journ. I), was drawn from a species of *Arion.*

Limax campestris, Binney.—Color usually of various shades of amber, without spots or markings, sometimes blackish; head and eye-

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peduncles smoky; body cylindrical, elongated, terminating in a very short carina at its posterior extremity; mantle oval, fleshy, but little prominent, with fine concentrical lines; back covered with prominent elongated tubercles and furrows; foot narrow, whitish; respiratory foramen on the posterior dextral margin of the mantle; body covered with a thin, watery mucus. Length, about 25 mill.

Fig. 108.

Limax campestris.

Limax campestris, BINNEY, Proc. Bost. Soc. 1841, 52; Bost. Journ. Nat. Hist. IV, 169 (1842); Terr. Moll. II, 41 pl. lxiv, f. 3.—ADAMS, Shells of Vermont, 163 (1842).—DEKAY, N. Y. Moll. 23 (1843).—LEIDY, T. M. U. S. I, 250, pl. ii, f. 5, 6 (1851), anat.

Inhabits all the New England, Middle, and Western States, and is probably widely diffused through the country.

The resemblances between some of the species of this genus are so great that it is difficult to provide them with distinctive characters, and it is only by close comparison that their differences can be seen. The present species, although considerably smaller, is nearly allied to *Limax agrestis*.

Its differential characters are as follows: It is always much smaller, and at all ages possesses a peculiarly gelatinous or semi-transparent consistency. The tuberosities of the surface are more prominent in proportion to their size, are not flattened or plate-like, and are not separated by darker colored anastomosing lines, the intervening furrows being of the same color as the general surface. It does not secrete a milky mucus at every part of the surface when touched. Like that species, it is active in its motions, and suspends itself by a thread of mucus.

This species appears to be common to all the northern parts of the United States. It is found under decaying wood in the forests and in open pastures, and under stones at road-sides. From its wide distribution, it would seem to be indigenous.

Its testaceous rudiment is minute and delicate in proportion to the small size of the animal.

SPURIOUS SPECIES OF LIMAX, &C.

Limax marmoratus, DEKAY. See *Tebennophorus caroliniensis*.

Limax columbianus, GOULD, I have referred to *Ariolimax*.

Limax fuliginosus, GOULD, and

Limax olivaceus, GOULD, are erroneously referred to America by Grateloup (Distr. Geog. Lim. p. 30).

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Limax lineatus, DeKay (see Terr. Moll. II, 33), is mentioned by name only, without description.

To vol. I, p. 48 *et seqq.* and vol. IV, p. 32, of the Terrestrial Mollusks, I refer for information regarding the following species of Rafinesque. Some of them are mentioned by Ferussac, Gray, Gratelloup, &c., but no additional information is given by them:—

Limax gracilis (*Deroceras*). See also DeKay, N. Y. Moll. 22; Gray and Pfeiffer, Brit. Mus. Cat.

Eumelus lividus.

Eumelus nebulosus.

Rafinesque also mentions—by name only, though not from America, no locality being given—*Zilotea*, *Urcinella*, and *Testacina* (Analyse de la Nature; see Binney and Tryon's edition of Rafinesque, 17).

Subfamily HELICINÆ.

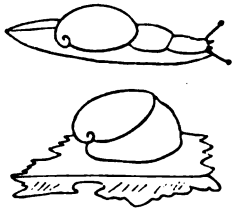
Jaw arcuate, with stout vertical ridges, reaching to and crenulating the concave margin; no middle projection.

Teeth of the lingual ribbon uniform, short, bicuspid or tricuspid.

BINNEIA, J. G. Cooper.

Body about three times as long as shell, semi-cylindrical, obtuse in front, forming an acute angle behind; foot extending the whole length, somewhat distinct anteriorly, and carinate behind. Mantle shield-like, covering the back anterior to the shell for about one-fourth its length, not reflected over the shell. Eye-peduncles moderate, slender; two short, acute tentacles in front of head. Respiratory orifice ——? Generative orifice ——?

Fig. 109.



Animal of *Binneia notabilis*. [Cooper.]

Shell entirely external, unguiform, nearly flat, about one-third as long as the animal, which it does not half cover when retracted. Spire flattened, forming two horizontal volutions, last whirl enormously expanded and slightly arched. Columella distinct, entire, hiding the interior of the convolutions; peristome simple, acute.

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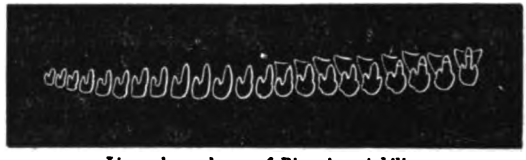
Jaw long, rather narrow, slightly arcuate; ends but little attenuated, almost square; anterior surface with about nine very broad, crowded ribs, each with a finely notched or crenulated margin on the convex cutting edge; upper margin of the jaw concave, smooth.

Fig. 110.

Jaw of *Binneia notabilis.*

Lingual membrane (of *B. notabilis*) with 100? rows of forty-three teeth each (21—1—21); centrals tricuspid; laterals and uncini bicuspid.

Fig. 111.



Lingual membrane of *Binneia notabilis.*

Binneia notabilis, J. G. Cooper.—Shell imperforate, depressed-orbicular, subunguiform, opaque, thin, light horn-color, striated; spire scarcely elevated; apex obtuse; suture deeply impressed; one and a half whirls, the first half with about thirty revolving, separated, prominent, abruptly ending rib like striæ, the last comprising almost the whole shell, depressed above, very rapidly increasing; aperture subhorizontal, transversely oval, very large; peristome thin, acute, simple; columella arcuate, with a thin deposit of transparent callus; apex visible from below. Greater diam. 7, lesser 3½, height 1½ mill.; greatest transverse diam. of aperture 7.

Fig. 112.

Binneia notabilis.

Binneya notabilis, J. G. Cooper, Proc. Cal. Acad. Nat. Sci. III, 62 (1863), figures.—Tryon, Am. Journ. Conch. II, 244, pl. iii, f. 4 (1866).

Sta. Barbara Island, California.

For views of the animal and lingual dentition, see above.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9358	1	Santa Barbara Isl., Cal.	Dr. J. G. Cooper.	Type.

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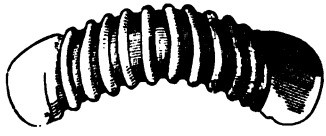
HELIX, Linn.

Body elongated, semi-cylindrical, tapering to a point posteriorly, convex above, plane beneath, the whole area forming a locomotive disk; integument reticulated by furrows; mantle simple, not extending beyond, and accurately fitting to the peristome of the shell, into which the whole animal may retire; head obtuse; eyes at the end of long, cylindrical, retractile peduncles; tentacles short, retractile; generative orifice on the side of the head, behind the right eye-peduncle; respiratory orifice in the collar, at the angle of the aperture of the shell, anal orifice immediately adjoining.

Shell discoidal, globose or conoid, aperture transverse, oblique, lunate or rounded, margins distinct.

Fig. 113.



Jaw of *Helix albolabris*. [Morse.]

Jaw arcuate, vertically ribbed, margins crenulated.

Lingual membrane broad, teeth numerous, centrals tricuspid,

Fig. 114.

Lingual dentition of *Helix multilineata*.

laterals bicuspid, uncini denticulated or serrated, centrals and laterals sometimes simply conical with an acute tip.

Subgenus MICROPHYSA, Albers.

Shell umbilicated, depressed, thin, delicately striate, scarcely shining; spire flattened; suture distinct; whirls 4–5, rather convex, gradually increasing, the last not descending; aperture roundly lunate; peristome thin, perfectly simple, its extremities converging.

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Helix vortex, Pfr.—Shell umbilicated, depressed, pale bluish-white, pearly, very thin, transparent; whirls five, prominent, with exceedingly minute, oblique striæ of increase; suture deeply impressed; base somewhat convex; axis open, umbilicus infundibuliform; aperture flattened-transverse; peristome thin, acute, not reflected. Greater diam. 6, lesser 5½; height 2¾ mill.

Fig. 115.

Helix vortex.

Helix vortex, Pfeiffer, Arch. f. Nat. 1839, II, 351; Mon. Hel. Viv. I, 95.—Chemnitz, ed. 2, II, 110, pl. lxxxviii, f. 7-9.—Reeve, Con. Icon. 644 (1852).—Gould, Terr. Moll. III, 34.—W. G. Binney, Terr. Moll. IV, 117.

Helix selenina, Gould, Bost. Proc. III, 38 (1848); in Terr. Moll. II, 240, pl. xxix, a, f. 2; pl. xlviii, f. 2.—Reeve, Con. Icon. 716 (1852).

Hyalina vortex, Tryon, Am. Journ. Conch. II, 252, pl. iv, f. 28 (1866).

Fig. 116.

Embryonic young of *Helix vortex*, enlarged.

Southern Florida and the adjacent islands; also some of the West Indies.

The species is apparently viviparous—Fig. 116 representing an embryonic shell taken from an adult by Mr. Morse.

Cat. No	No. of Sp.	Locality.	From whom received.	Remarks.
8684	1	Florida.	W. G. Binney.	Cab. series.

Helix incrustata, Pfeiffer.—Shell umbilicated, depressed, smooth, horn-colored, usually incrusted with dirt, with crowded striæ; spire slightly elevated, composed of four or five well-rounded whirls separated by a deeply impressed suture; beneath with a broad umbilicus, one-third the diameter of the shell, exhibiting all the whirls within; aperture circular, being but slightly impinged upon by the penult whirl, its extremities joined by a slightly appressed scale of enamel, rendering the peristome continuous; peristome slightly reflexed, so as to render the aperture somewhat campanulate. Greater diam. 4¾, lesser 4; height 2 mill.

Fig. 117.

Helix incrustata.

Helix incrustata, Pfeiffer, Memorias, I, 208, 212, pl. xii, f. 11-16.—Pfeiffer, Mon. Hel. Viv. III, 632.—W. G. Binney, Terr. Moll. IV, 68.

Helix saxicola, Gould in Terr. Moll. II, 174, pl. xxix, a, f. 4, not Pfeiffer.

Helix incrassata, Reeve, Con. Icon. 972.

Pseudohyalina incrustata, Tryon, Am. Journ. Conch. II, 265, pl. iv, f. 61 (1866).

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Galveston and Corpus Christi, Texas. Also near Havana, Cuba.

SUBGENUS **PATULA**, Hald.

Shell widely umbilicated, depressed, discoidal, turbinate, rugose or costulately-striate; whirls 4–6, equal or gradually increasing; aperture lunately-rounded; peristome simple, straight, acute.

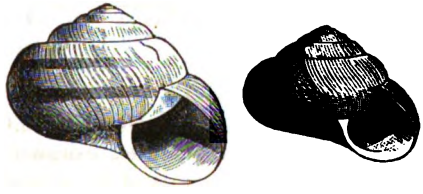
Animal (of *Helix solitaria*) stout, short, head blunt, eye-peduncles long, slender; foot but slightly projecting posteriorly.

Fig. 118.

Animal of *Helix solitaria*.

Helix solitaria, SAY.—Shell broadly umbilicated, globosely depressed, coarse, solid, diaphanous, obliquely and crowdedly wrinkled, from white to dark reddish horn-color with from two to three brownish revolving bands; whirls six, convex; suture deep; aperture roundedly-lunate, pearly white and banded within; peristome simple, acute, its ends joined by a thin transparent callus, that of the columella dilated, subreflected. Greater diam. 25, lesser 22; height 15 mill.

Fig. 119.



Helix solitaria and albino.

Helix solitaria, SAY, Journ. Phila. Acad. II, 157 (1821); BINNEY'S ed. 19.—DEKAY, N. Y. Moll. 43, pl. iii, f. 41 (1843).—BINNEY, Bost. Journ. Nat. Hist. III, 426, pl. xxii (1840); Terr. Moll. II, 208, pl. xxiv.—CHEMNITZ, 2d ed. I, 180, pl. xxiv, f. 5, 6.—PFEIFFER, Symbolæ, II, 39; Mon. Hel. Viv. I, 102.—REEVE, Con. Icon. 662 (1852).—W. G. BINNEY, Terr. Moll. IV, 96.—LEIDY, T. M. U. S. I, 254, pl. viii, f. 7–10 (1851), anat.

Anguispira solitaria, TRYON, Am. Journ. Conch. II, 260, pl. iv, f. 46 (1866).

In the States north of the Ohio River, in lower Missouri, and in the Cœur d'Alene Mountains. Montana? (*Cooper*). In the postpleiocene deposits of the Mississippi Valley.

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Microscopic revolving lines have been detected on some specimens. There is a form of a dark reddish-brown color, with one white band at the periphery, and the same color at the base around the umbilicus.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7947	1	.....	W. G. Binney.	.....
8016	5	.....	"	.....
8583	2	Ohio.	"	Cab. series.
8746	4	.....	.....	.....

Helix ayersiana, NEWCOMB.—Shell umbilicated, globosely-convex, rather thick, of a dead white with a narrow revolving brownish band, with rough oblique incremental striæ deeply cut by coarse revolving lines; whirls seven, rather convex, the last globose, descending in front; spire elevated; umbilicus small; aperture oblique, subcircular, banded within; peristome simple, its ends joined by a light callus, that of the columella widened, reflected over and half concealing the umbilicus. Greater diam. 21, lesser 19; height 12¼ mill.

Fig. 120.

Helix ayersiana.

Helix ayersiana, NEWCOMB, Proc. Cal. Acad. Nat. Sci. II, 103 (1861).

Aglaja ayersiana, TRYON, Am. Journ. Conch. II, 312 (1866); III, pl. xi, f. 28 (1867).

Northern Oregon (*Newcomb*); Santa Cruz Island, Cal. (*J. G. Cooper*).

My description and figure are drawn from an authentic specimen.

Helix strigosa, GOULD.—Shell broadly umbilicated, orbicular, slightly, and about equally, convex above and beneath, surface irregular, and roughened above by indentations and coarse lines of growth, and by occasional fine revolving lines; smoother and shining beneath; color ashy gray, somewhat mottled with dusky, or altogether rusty brown above, with, usually, a single, faint, revolving band on the middle of each whirl, and often with numerous bands, unequal in size and distance, beneath; whirls five, moderately convex, the last one carinated at its commencement, and deflexed; aperture very oblique, circular; peristome simple, acute, almost continuous, terminations approaching, joined by thick callus, that of the

Fig. 121.

Helix strigosa.

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columella subreflected. Greater diameter 21, lesser 18; height 10 millimetres.

Helix strigosa, GOULD, Proc. Bost. Soc. Nat. Hist. II, 166 (1846); Expl. Exped. Moll. 36, f. 41 (1852); Terr. Moll. II, 210, pl. xxvi, a.—PFEIFFER, Mon. Hel. Viv. I, 121; IV, 91; Mal. Bl. 1857, 321.—W. G. BINNEY, Terr. Moll. IV, 23.

Anguispira strigosa, TRYON, Am. Journ. Conch. II, 261, pl. iv, f. 40 (1866).

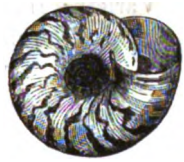
From the Rio Piedro of western New Mexico to the Big Horn Mountains, Nebraska. It seems to inhabit all the central basin.

Apparently viviparous (see Bland, Ann. N. Y. Lyc. VII, 367).

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8563	1	Int. of Oregon.	Com. Wilkes.	Cab. series.
9007		Canon Largo, N. M.	Dr. Newberry.	.....
9008		Rio Pedro, N. M.	.....	.....

Helix alternata, SAY.—Shell broadly umbilicated, orbicularly-depressed, thin, smoky horn-color varied with red, interrupted, obliquely arranged patches and spots, roughened by crowded, elevated rib-like striæ, smoother below; whirls five and one-half, flattened, the last sometimes obtusely carinated at its periphery; umbilicus large, pervious; aperture very oblique, lunately-rounded, banded within; peristome simple, acute, its terminations joined by a very thin, transparent callus, that of the columella subreflected. Greater diam. 21, lesser 19; height 10 mill.

Fig. 122.



Helix alternata.

Helix alternata, SAY, Nich. Encycl. pl. i, f. 2 (1817, 1818, 1819); Journ. Philad. Acad. II, 161 (1821); BINNEY's ed. 6, 21, pl. lxix, f. 2.—EATON, Zool. Text-Book, 193 (1826).—BINNEY, Bost. Journ. Nat. Hist. III, 428, pl. xxv (1840); Terr. Moll. II, 212, pl. xxiv.—GOULD, Invert. 177, f. 114 (1841).—LEIDY, T. M. U. S. I, 253, pl. vii, f. 2–5 (1851), anat.—DEKAY, N. Y. Moll. 29, pl. ii, f. 9 (1843).—ADAMS, Vermont Mollusca, 162, fig. (1842).—FERUSSAC, Tab. Syst. 44; Hist. pl. lxxix, f. 8, 9, 10.—POTIEZ & MICHAUD, Galerie, 104.—CHEMNITZ, 2d ed. I, 181, tab. xxiv, f. 17, 18.—PFEIFFER, Mon. Hel. Viv. I, 102.—DESHAYES in FER. Hist. I, 89.—REEVE, Con. Icon. 670 (1852).—BILLINGS, Canad. Nat. II, 99, f. 4, 5 (1857).—W. G. BINNEY, Terr. Moll. IV, 98.—BLAND, Ann. N. Y. Lyc. VII.—MORSE, Amer. Nat. I, 187, f. 17, 18 (1867).

Anguispira alternata, MORSE, Journ. Portl. Soc. I, 11, f. 15; pl. iv, f. 16 (1864).—TRYON, Am. Journ. Conch. II, 261, pl. iv, f. 47 (1866).

Helix scabra, LAMARCK, Anim. sans Vert. VI, part 2, 88.—DESHAYES,

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Encycl. Méth. II, 219 (1830); in LAMARCK, VIII, 66; ed. 3, III, 292. —CHENU, Ill. pl. vi, f. 11.

Helix infecta, PARREYSS MS., PFEIFFER, Mal. Bl. 1857, 86; Mon. Hel. Viv. IV, 91, non REEVE.

Helix strongylodes, PFEIFFER, Proc. Zool. Soc. 1854, 53; Mon. Hel. Viv. IV, 91.—REEVE, Con. Icon. no. 1296 (1854).—*Vide* W. G. BINNEY, Terr. Moll. IV, pl. lxxvii, f. 8.

Helix mordax, SHUTTLEWORTH, Bern. Mitt. 1853, 195.—GOULD in Terr. Moll. III, 19.—W. G. BINNEY, Terr. Moll. IV, 99.—PFEIFFER, Mon. Hel. Viv. III, 635.—BLAND, Ann. N. Y. Lyc. VII (and var. *fergusoni*).

Helix dubia, SHEPPARD, Tr. Lit. Hist. Soc. Quebec, I, 194.—MCCULLOCH (where?), teste BINNEY, Terr. Moll. I, 192.

Found over the whole of eastern North America as far north as Labrador. It is commonly found in the postpleiocene of the Mississippi Valley, retaining some of the color of the red flame-like patches.

Animal: head and eye-peduncles light slate-color, back brown, remainder of upper surface brownish-orange, eyes black, base of foot grayish-white, collar saffron. Eye-peduncles one-third of an inch long, blackish at the extremities. Foot not much exceeding in length the diameter of the shell, and terminating in a broad, obtuse, and flat extremity. A light marginal line runs along the edge of the foot from the head to the posterior part, those of the two sides meeting in an acute angle.

Variety: Head and neck blackish-brown, eye-peduncles blackish, foot brownish, base dirty white. In a single instance the whole animal was entirely black.

Fig. 123.

Helix alternata, carinated.

The variation of color ranges from pale straw to dark reddish-brown, in each extreme being sometimes uniform. In outline the variation ranges from depressed to very globose. In sculpturing it varies greatly. A comparatively smooth variety, with a shining, somewhat translucent epidermis has been noticed in New York, by Mr. Bland, under the name of var. *fergusoni*. A form with stronger striæ and well-developed carina is figured in Fig. 123. The coarsely striated form, which I presume to be *H. mordax*, is figured also (Fig.

Fig. 124.

Helix alternata, var. *mordax*?

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Fig. 125.

Surface of *Helix alternata.*

124). I have also given a figure (Fig. 125) of the magnified surface of a strongly ribbed form from North Carolina, and a view (Fig. 126) of a strongly ribbed form from the postpleiocene.

Fig. 126.

Helix alternata.

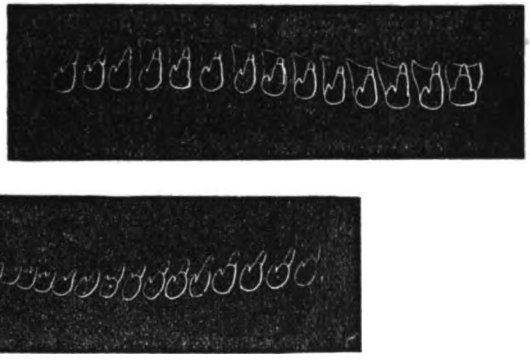
The jaw of *H. alternata* does not have the anterior ribs and crenulated concave margin characteristic of the genus. It is arcuate, equally broad in its whole length, with square ends; anterior surface strongly striate both transversely and vertically; concave margin not strongly crenulated, but having no median projection. Both the jaws figured were taken from individuals of this species.

Fig. 127. Fig. 128.

Jaw of *Helix alternata.*

Lingual membrane with 121 waving rows of 34—1—34 teeth each; centrals with one long, stout cusp, surmounted by an acute,

Fig. 129.



Lingual dentition of *Helix alternata.* [MORSE.]

cone-like point, and two lateral, obsolete ones; laterals of same shape, but distinctly bicuspid; uncini at first like the laterals, but modified as they pass off laterally by the cusps becoming of more equal length.

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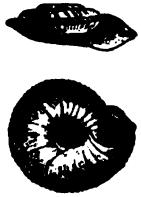
Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7948	1	L'eau qui Court.	.....	.....
7964	7	.....	W. G. Binney.	.....
7965	1	.....	"	Strongly ribbed.
7966	9	Grand Rapids, Mich.	Dr. J. Lewis.	.....
7967	1	Marietta, Ohio.	W. Holden.	.....
7968	6	Kansas?	.....	Very high spire.
7969	3	Lake of the Woods.	R. Kennicott.	.....
7970	3	Windsor, N. S.	.....	.....
7972	2	St. Louis, Mo.	.....	.....
7973	1	St. Clair River.	.....	.....
7974	3	Illinois.	.....	.....
7975	3	Milwaukee, Wis.	I. A. Lapham.	.....
7976	2	Texas. [Bay, Me.	Lieut. Couch.	.....
7977	4	Broken Cave, Casco	Dr. J. Lewis.	.....
8036	15	Goose Island, Mich.	.....	.....
8613	2	Ohio.	W. G. Binney.	Cab. series.
8732	2	.....	W. Stimpson.	Strongly ribbed var.
8768	2	Burlington, Vt.	"	.....
8781	1	Labrador (Casco).	"	.....
8814	6	Texas.	W. G. Binney.	Strongly ribbed.
8835	1	Eastern Georgia.	Dr. Jones.	"
9173	200+	Vermont.	Chittenden.	.....
8990		Western Texas.	.....	.....
8960		Hot Spr., Ark.	Dr. B. Powell.	.....

Helix cumberlandiana, LEA.—Shell broadly umbilicated, lenticular, acutely carinated, rather thin, sculptured with coarse, acute rib-striæ, of a pale yellowish, or sometimes ash color, irregularly checked with radiating, waved, brown blotches; spire depressed, of about five whirls, very slightly convex, but excavated towards the margin, which is acute, and with a marginal, impressed line on both sides of the edge; beneath, somewhat less convex, but the striæ less prominent, and its centre excavated by a deep, broad umbilicus, one-third the diameter of the base, and exhibiting all the whirls to the apex; aperture rather wider than high, rendered somewhat rhomboidal by the acute carina; peristome simple, acute, its columellar extremity somewhat dilated and reflected. Greater diam. 15, lesser 13; height 5 mill.

Fig. 130.



Helix cumberlandiana.

Carocolla cumberlandiana, LEA, Trans. Am. Phil. Soc. VIII, 229, pl. vi, f. 61; Obs. III, 67; Proc. I, 289.—TROSCHEL, Arch. für Nat. 1843, II, 124.—DEKAY, N. Y. Moll. 47 (1843).

Helix cumberlandiana, PFEIFFER, Mon. Hel. Viv. I, 125; III, 114.—BINNEY, Terr. Moll. II, 216, pl. xxxi.—REEVE, Con. Icon. 701 (1852).—W. G. BINNEY, Terr. Moll. IV, 99.

Anguispira cumberlandiana, TRYON, Am. Journ. Conch. II, 262, pl. iv, f. 48 (1866).

University Place, Franklin Co., Tennessee.

Animal dirty white, darker towards the tail, the top of the head and eye-peduncles, which last are dark slate-colored; foot about the length of the lesser diameter of the shell, with a darker

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submarginal line as in *H. alternata*, and terminating in a flattened, broad, spade-like extremity like the *Zonites*. When in motion none of the animal protrudes beyond the shell behind (looking from above)—before there is but little visible, about as long as the diameter of the last whirl; the breadth of the animal before the shell is about one-half the same diameter.

Lingual membrane with 86 rows of 24—1—24 stout, short

Fig. 131.

Lingual dentition of *Helix cumberlandiana*.

teeth each; centrals with a triangular base surmounted by a conical point; laterals of same shape; uncini bidentate.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
..	1	Cumberland Mts.	W. G. Binney.	.....

Helix tenuistriata, Binney.—Shell flattened, the upper surface acutely carinated; epidermis light horn-color; whirls seven, narrow, increasing in width very gradually from the apex to the aperture; striated with fine, prominent, distinctly separated, curved lines; aperture angular, depressed, contracted; peristome above the carina acute, below a little reflected; base subconvex, smooth; umbilicus open, moderate in size, exhibiting two or three volutions. Greatest transverse diameter about half an inch.

Found hitherto only in the eastern part of Tennessee, whence a single specimen was brought by Mr. Haldeman. This pretty species is described with some reluctance from a single specimen, as it may be considered doubtful until another be found, whether it may not be a foreign shell introduced by mistake among Tennessean shells. It is quite flat on the upper surface, rising a little towards the apex; the whirls, which are distinctly marked, are beautifully striated with delicate prominent curved lines, which are crowded towards the apex, and separated by a distinct interval on the outer whirl; they terminate on the edge of the carina, which is a little plaited by them, the base below being smooth. The aperture is narrow, and marked by an angle at the carina. The lip below the carina has a distinct, though narrow reflection. The umbilicus is moderate, conical, and rather deep, exhibiting about three volutions. In Lamarck's arrangement it would be a *Carocolla*.

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Helix tenuistriata, BINNEY, Bost. Journ. Nat. Hist. 1842, IV, part 1, cover, p. 3.—PFEIFFER, Mon. Hel. Viv. I, 432.—W. G. BINNEY, Terr. Moll. IV, 118.

Helix vortex, teste GOULD (non PFEIFFER), Terr. Moll. III, 34.

This is an unknown species; the above description is copied from manuscript of Dr. Binney.

Helix cooperi, W. G. BINNEY.—Shell umbilicated; elevated, globose; solid, coarse and rough with oblique incremental striæ intersected with delicate spiral lines; color white, variously marked with a single narrow band, or broader longitudinal and spiral patches of reddish-brown;

Fig. 132.

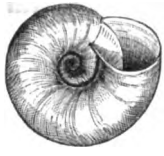

Fig. 133.

Fig. 134.

Fig. 135.

Fig. 136.

Fig. 137.

Helix cooperi.

suture impressed; spire elevated; whirls five, convex, the last rounded, very decidedly deflected at the aperture; umbilicus moderate, pervious, one-fifth the greater diameter of the shell; aperture very oblique, circular; peristome simple, thickened, with its extremities very nearly approached, and joined by a heavy white callus, that of the columella reflected. Greater diam. 20, lesser 16; height 13 mill.

Helix cooperi, W. G. BINNEY, Proc. Acad. Nat. Sci. Phila. 1858, 118; Terr. Moll. IV, 97, pl. lxxvii, f. 11.—PFEIFFER, Mal. Blatt. 1859, 6.

Anguispira cooperi, TRYON, Am. Journ. Conch. II, 260, pl. iv, f. 52 (1866).

Black Hills of Nebraska and in the central basin from New Mexico to lat. 48°.

The species varies greatly in shape, as seen in the figures given of various forms. It is sometimes strongly carinated, and the peristome is sometimes made continuous by the heavy, raised callus connecting its extremities.

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Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8677	4	Utah?	Capt. J. H. Simpson.	Cab. series.
9000		La Poudre River.	Dr. F. V. Hayden.	.....
9001		Base of Big Horn.	"	.....
9002		W. side Wind River Mts.	"	.....
9003		.....	"	.....
9004		Base of Big Horn.	"	.....
9005		Deer Creek Canyon.	"	.....
9006		" "	"	.....

Helix idahoensis, NEWCOMB.—Shell umbilicated, globosely elevated, thick, white, rough, with stout, distant, oblique, curving, blunt ribs, of which twenty-eight are upon the last whirl; suture impressed; spire highly elevated; apex waxen, smoother, obtuse; whirls five, convex, the last equally globose above and below, hardly falling before; umbilicus moderate, one-sixth the lesser diameter of the shell; aperture oblique, almost circular; peristome simple, made almost continuous by a heavy parietal callus connecting its approximating ends, that of the columella slightly expanded and reflected over a portion of the umbilicus. Greater diam. 13, lesser 11; height 7 mill.

Fig. 138.

Helix idahoensis.

Helix idahoensis, NEWCOMB, Am. Journ. Conch. II, 1, pl. i, f. 1–3 (1866).

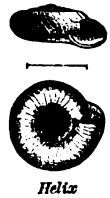
Anguispira idahoensis, TRYON, Am. Journ. Conch. II, 260, pl. iv, f. 54 (1866).

Idaho Territory, between Idaho City and Cœur d'Alene mining district.

The shell figured was received from Dr. Newcomb. The species in texture and form resembles somewhat a small elevated *Helix cooperi.*

Helix perspectiva, SAY.—Shell broadly and perspectively umbilicated, orbicular, scarcely convex above, excavated below, thin, reddish horn-color, regularly ribbed; whirls six and a half, gradually increasing; aperture small, lunately subcircular, within furnished with a single subprominent tooth on the base of the shell; peristome simple, acute, its extremities separated widely. Greater diam. 8, lesser 7½; height 3 mill.

Fig. 139.



Helix perspectiva.

Helix perspectiva, SAY, Journ. Phila. Acad. I, 18 (1817); Nich. Encycl. IV, ed. 3 (1819); BINNEY's ed. 9.—BINNEY, Bost. Journ. Nat. Hist. III, 430, pl. xxi, f. 4 (1840); Terr. Moll. II, 256, pl. xxx, f. 1.—DEKAY, N. Y. Moll. 42, pl. iii, f. 38 (1843).—FERUSSAC, Tab.

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Syst. 44; Hist. Nat. des Moll. pl. lxxix, f. 7.—Deshayes in Lam. VIII, 130; 3d ed. III, 315; in Fer. I, 81.—Chemnitz, 2d ed. II, 114, tab. lxxxv, f. 30–32; Pfeiffer, Mon. Hel. Viv. I, 103; III, 99 (excl. *H. filiola*).—Reeve, Con. Icon. 695.—W. G. Binney, Terr. Moll. IV, 122.—Leidy, T. M. U. S. I, 153, pl. vii, f. 4–7 (1851), anat.

Helix patula, Deshayes, Encycl. Méth. II, 217 (1830).

Anguispira perspectiva, Tryon, Am. Journ. Conch. II, 262, pl. iv, f. 50 (1866).

North of Maryland it is not found east of the Appalachian chain, but elsewhere is probably found over the whole of eastern North America. Also in the postpleiocene of the Mississippi Valley.

Cat No.	No. of Sp.	Locality.	From whom received.	Remarks.
8014	11	Columbus, Ga.	Dr. J. Lewis.	.....
8015	28	Fleming, Centre Co., Pa	.....	.....
8016	1	Alabama.	.....	.....
8017	8	Hiram, Ohio.	.....	.....
8018	20	N. Georgia.	A. Gerhardt.	.....
8019	3	Milwaukee, Wis.	I. A. Lapham.	.....
8020	15	Marietta, Ohio.	W. Holden.	.....
8615	10	.....	W. G. Binney.	Cab. series.

Helix striatella, Anthony.—Shell umbilicated, orbicularly-convex, thin, brownish horn-color, with crowded ribs; whirls four, scarcely convex, the last inflated below, rather wide; umbilicus large, pervious, aperture subcircular; peristome simple, acute, its terminations approached. Greater diam. 6, lesser 5½; height 3 mill.

Fig. 140.

Helix striatella.

Helix striatella, Anthony, Bost. Journ. Nat. Hist. III, 278, pl. iii, f. 2 (1840).—Binney, Bost. Journ. Nat. Hist. III, 432, pl. xxi, f. 5 (1840); Terr. Moll. II, 217, pl. xxx, f. 2.—Gould, Invert. 178, f. 112 (1841).—Adams, Vermont Mollusca, 162 (1842).—DeKay, N. Y. Moll. 43, pl. iii, f. 40 (1843).—Chemnitz, 2d ed. II, 115, tab. lxxxv, f. 36–38.—Pfeiffer, Mon. Hel. Viv. I, 104.—Reeve, Con. Icon. 727 (1853).—W. G. Binney, Terr. Moll. IV, 99.—Morse, Amer. Nat. I, 545, f. 40 (1867).

Helix ruderata, Adams, Sill. Journ. [1] 40, 408, not Studer.

Helix cronkheitei,[1] Newcomb, Proc. Cal. Acad. Nat. Sci. III, 180 (1865).

Patula striatella, Morse, Journ. Portl. Soc. I, 21, f. 48, pl. ii, f. 6; pl. viii, f. 49 (1864).

Anguispira striatella, Tryon, Am. Journ. Conch. II, 262, pl. iv, f. 51 (1866).

Patula cronkheitei, Tryon, Am. Journ. Conch. II, 263 (1866).

[1] My opinion of this species is formed from the description alone. I have seen no authentic example.

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This is a northern species, being found through British America, at Great Slave Lake, &c., Canada, New England, and extends to Virginia and Kansas. Also on the Pacific side of the Rocky Mountains—Hell-Gate River.

Jaw arcuate, ends attenuated; anterior surface with converging striæ; concave margin irregularly notched, no median projection.

Fig. 141.

Jaw of *Helix striatella*. [MORSE.]

Lingual membrane with 100 rows of 16—1—16 teeth; centrals tricuspid, the side cusps very small;

Fig. 142.

Lingual dentition of *Helix striatella*. [MORSE.]

laterals of same shape, but bicuspid; laterals short, broad, bidentate.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7927	42	Kansas.	.....	In drift wood of river.
7956	22	Marietta, Ohio.	W. Holden.	.....
8043	2	Cincinnati, Ohio.	J. G. Anthony.	.....
8044	19	Mohawk, N. Y.	Dr. J. Lewis.	.....
8390	7	.....	W. G. Binney.	Cab. series.
8754	50	Massachusetts.	W. Stimpson.	.....
9194	2	Labrador.	Storer.	.....
9078	10	British America.	R. Kennicott.	.....

Helix hornii, GABB.—Shell umbilicated, globosely depressed, thin, coarse, reddish horn-color, under the epidermis obliquely striate, hirsute; whirls four, scarcely convex, the last inflated below; umbilicus pervious, showing the whirls to the apex; aperture oblique, subcircular; peristome simple, acute, its ends hardly approaching, that of the columella not widened, nor reflected. Greater diam. 4, lesser 3½; height 1 mill.

Fig. 143.

Helix hornii.

Helix hornii, GABB, Am. Journ. Conch. II, 330, pl. xxi, f. 5 (1866).

Hyalina hornii, TRYON, Am. Journ. Conch. III, 163, pl. xi, f. 36–38 (1867).

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Fort Grant, Arizona, at the junction of the Arivapa and San Pedro Rivers.

My description and figure are drawn from an authentic specimen.

Helix mazatlanica, PFEIFFER.—Shell umbilicated, depressed, with crowded rib-like striæ, horn-colored; spire somewhat convex; whirls four, rather convex, perceptibly increasing, the last round, scarcely descending before; umbilicus scarcely equalling one-third the shell's diameter; aperture remote from the axis, oblique, roundly lunate; peristome simple, straight, its extremities converging, that of the columella somewhat expanding in its upper portion. Greater diam. 2½, lesser 2; height scarcely 1 mill.

Fig. 144.

Helix mazatlanica, enlarged.

Helix mazatlanica, PFEIFFER, Mal. Blatt. 1856, 43; Mon. Hel. Viv. IV, 89.—BLAND, Ann. N. Y. Lyc. VIII, 164, f. 9.

Pseudohyalina mazatlanica, TRYON, Am. Journ. Conch. II, 266, pl. iv, f. 59 (1866).

Mazatlan.

Fig. 144 is drawn from a specimen furnished me by Dr. Pfeiffer.

Helix asteriscus, MORSE.—Shell widely umbilicated, orbicularly depressed, light brown, decussated by delicate incremental and revolving striæ and with from twenty-five to thirty delicate, thin, transparent, prominent ribs, with waving edges and inclined backwards, more like the epidermis than the texture of the shell; whirls four, the upper ones flattened, the last globose; suture deeply impressed; aperture subcircular; peristome simple, acute, its columellar extremity subreflected. Greater diam. 1½, height ½ mill.

Fig. 145.

Helix asteriscus, enlarged.

Helix asteriscus, MORSE, Proc. Bost. Soc. VI, 128 (1857).—W. G. BINNEY, Terr. Moll. IV, 103, pl. lxxvii, f. 9.—BLAND, Ann. N. Y. Lyc. VIII, 163, f. 8.—MORSE, Amer. Nat. I, 546, f. 43 (1867).

Planogyra asteriscus, MORSE, Journ. Portl. Soc. I, 24, f. 50–52, pl. ii, f. 5; pl. viii, f. 53 (1864).—TRYON, Am. Journ. Conch. II, 263, pl. iv, f. 55 (1866).

From Gaspé to the north of Lake Superior, and through New England.

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Fig. 146.

Animal of *Helix asteriscus*. [MORSE.]

The animal is described by Morse as bluish-white, with head, neck, and eye-peduncles mottled by streaks and dots of bluish-black; disk yellowish-white.

Jaw but slightly arcuate, of uniform width throughout, long, narrow, ends blunt; anterior surface with coarse striæ, not modifying the concave margin, which has an obtuse, wide, slight median projection.

Fig. 147.

Jaw of *Helix asteriscus*. [MORSE.]

Lingual membrane with 77 rows of 13—1—13 teeth each; centrals very short, tricuspid; laterals long, bicuspid; uncini wide, narrow, serrate.

Fig. 148.

Lingual dentition of *Helix asteriscus*. [MORSE.]

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9359	3	Maine.	E. S. Morse.	.....

SUBGENUS **STROBILA**, Morse.[1]

Shell umbilicated, globose conic or depressed, obliquely and coarsely striated, smoother below; whirls 5 or 6, the last globose; aperture lunately rounded; peristome thickened, reflected; the parietal wall and base of the last whirl each with two or more entering revolving laminæ.

Animal quite small in comparison to the size of the shell; eye-peduncles thick, bulbous, eyes very large (*H. labyrinthica*).

Fig. 149.

Animal of *Helix labyrinthica*. [MORSE.]

[1] Journal Portland Society Nat. Hist. I, 26 (1864).

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Helix labyrinthica, SAY.—Shell umbilicated, globose-conic, brownish horn-color, with stout ribs above, and below lighter with arborescent wrinkles; spire obtuse; umbilicus narrow, pervious; aperture scarcely oblique, lunately rounded; peristome briefly reflected, thickened; parietal wall with three revolving, deeply entering, parallel laminæ, the central further within the aperture and less developed, and around the axis one stout lamella-like rib not reaching the columella; on the base of the outer whirl are two short, deeply seated internal revolving rib-like laminæ. Greater diam. 2½, height 1⅞ mill.

Fig. 150.

Helix labyrinthica, enlarged.

Helix labyrinthica, SAY, Journ. Phila. Acad. I, 124 (1817); Nich. Encycl. ed. 3, IV (1819); ed. BINNEY, 10.—BINNEY, Bost. Journ. Nat. Hist. III, 393, pl. xxvi, f. 1 (1837); Terr. Moll. II, 202, pl. xvii, f. 3.—GOULD, Invertebrata, 184, f. 106 (1841).—ADAMS, Vermont Mollusca, 160 (1842).—FERUSSAC, Tab. Syst. 38; Hist. pl. li, B, f. 1.—PFEIFFER, Symbolæ, II, 31; Mon. Hel. Viv. I, 416.—CHEMNITZ, 2d ed. I, 382, t. lxvi, f. 17-20.—REEVE, Con. Icon. no. 728 (1852).—DEKAY, N. Y. Moll. 39, pl. iii, f. 31 (1842).—DESHAYES in FER. I, 210.—W. G. BINNEY, Terr. Moll. IV, 95.—MORSE, Amer. Nat. I, 545, f. 41, 42 (1867).

Strobila labyrinthica, MORSE, Journ. Portl. Soc. I, 26, f. 64–67, pl. ii, f. 12, a b; pl. viii, f. 68 (1864).—TRYON, Am. Journ. Conch. II, 259, pl. iv, f. 44 (1866).

Inhabits all of eastern North America.[1] Also occurs in the postpleiocene of the Mississippi Valley.

Mr. Morse has lately given the following description of the internal laminæ which characterize this species:—

The shell has been described as having one revolving tooth within the aperture, and sometimes a second one terminating farther within the aperture. I have always found this second one constant, and also a *third* one but slightly raised between these two. At the base of the shell and far within the aperture are two more revolving ribs, running about a third of one volution. These are plainly visible through the substance of the shell. A heavy columellar tooth or rib extends from a slight distance within the aperture, nearly one volution back. This columellar tooth thickens the substance

Fig. 151.

Helix labyrinthica, enlarged.

[1] Woodward (Man. 384) refers an extinct English Eocene *Helix* to this species. I have seen no specimens of it, but cannot believe it identical. Mr. Bland writes me that he has received from France a fossil shell under the name of *H. labyrinthicula*, apparently identical with our species.

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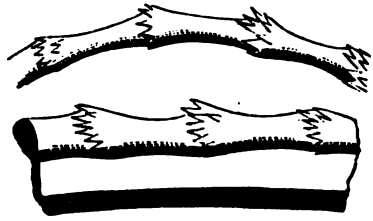
of the shell in the umbilical region and causes a distinct fold without the shell. A most singular feature is revealed in the structure of the parietal laminæ. With an ordinary magnifying power, small swellings are seen at close intervals along these laminæ, which, when magnified four hundred diameters, are seen to be surmounted with from five to ten sharp spines pointing towards the aperture. These swellings appear to coincide in number and position with the raised ribs without the shell, though they are not formed at the same time; for as these laminæ approach the aperture they become attenuated and disappear. The surface upon which these laminæ rest is granulated, and not smooth as is generally the case with the interior of shells. It is difficult to imagine the use of these spiny projections, unless they may act in some way as points of resistance to the animal for the support of a very heavy shell.

Fig. 152.



Parietal laminæ of *Helix labyrinthica*.

Fig. 153.

Jaw of *Helix labyrinthica*. [MORSE.]

Jaw long, narrow, very slightly arcuate, ends pointed; concave margin slightly notched.

Lingual membrane with 78 rows of 13—1—13 teeth each; centrals tricuspid, central cusp very long; laterals of same shape but bicuspid; uncini short, broad, serrated.

Fig. 154.

Lingual dentition of *Helix labyrinthica*. [MORSE.]

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7935	5	Massachusetts.	W. Stimpson.	.....
7936	6	Maine.	Dr. J. Lewis.	.....
8045	3	Milwaukee, Wis.	I. A. Lapham.	.....
8579	10	.....	W. G. Binney.	Cab. series.

Helix hubbardi, BROWN.—Shell umbilicated, depressed, thin, obliquely striated above, smooth below, reddish horn-color; whirls four and a half to 5, convex, regularly increasing, the last but slightly descending;

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umbilicus wide; aperture quite oblique, subcircular; peristome thickened, somewhat reflected, white, not covering the umbilicus; internal laminæ four, two upon the parietal wall of the aperture, of which the upper one is much more developed than the lower; the two remaining ones placed deep within the last whirl on its base. Greater diam. 2½, height 1¼ mill.

Fig. 155.

Helix hubbardi, enlarged.

Helix hubbardi, A. D. Brown, Proc. Acad. Nat. Sci. Philad. 1861, 333.

Strobila hubbardi, Tryon, Am. Journ. Conch. II, 259, pl. iv, f. 45 (1866).[1]

Found near Indianola, Calhoun Co., Texas.

Subgenus **POLYGYRA**, Say.

Shell umbilicated or perforated, orbicularly flattened, obliquely and costulately striate; whirls 5–7½, gradually increasing, the last anteriorly constricted, briefly deflected, inflated below, devious, the penultimate whirl plainly conspicuous, very often constricting the rimate umbilicus; aperture subreniform, or irregularly sinuate; peristome narrowly reflected, heavy, its margins usually dentate and joined by a triangular, dentiform callus, obliquely entering on the parietal wall of the aperture.

Fig. 156.

Animal of *Helix septemvolva*.

Animal very small and short in proportion to size of shell, with long, slender eye-peduncles; shell carried horizontally.

Helix auriculata, Say.—Shell rimately perforated, flattened above, inflated below, with rib-like striæ, reddish horn-color or brownish; whirls five and a half, narrow, the last deflected at the aperture, disjoined, constricted and scrobiculated below; umbilicus level, showing only the penultimate whirl; aperture subhorizontal, ear-shaped, ringent, almost closed; peristome continuous, its terminations joined by an oblong, entering, excavated fold, the right margin furnished within with a deep lamellar fold, and form-

Fig. 157.

Helix auriculata, enlarged.

[1] This figure does not correctly represent the species. In quoting it I mean to say that it was intended to represent the species. The same remark applies to many other figures in the same Monograph.

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ing a subacute angle with the basal margin, on which is one broad tubercle. Greater diam. 16, lesser 13; height 7½ mill.

Polygyra auriculata, Say, Nich. Encycl. 3d Am. ed. (1819); Journ. Phila. Acad. I, 277 (1818); Binney's ed. 10.

Helix auriculata, Ferussac, Hist. pl. l, f. 4 (1822).—Binney, Bost. Journ. Nat. Hist. III, 384 (ex parte), pl. xix, f. 1 (1840), excl. syn.; Terr. Moll. II, 186, pl. xl, f. 1 (left hand).—Leidy, T. M. U. S. I, 255, pl. ix, f. 5, 6 (1851), anat.—DeKay, N. Y. Moll. 47, pl. iii, f. 28 (1843).—Pfeiffer, Mon. Hel. Viv. I, 417; IV, 318, excl. var. (1853).—Chemnitz, ed. II, 371, t. lxv, f. 3, 4.—Deshayes in Fer. Hist. 76 (excl. var.), pl. l, f. 4; in Lam. VIII, 112: ed. 3, III, 308.—Reeve, Con. Icon. no. 700, excl. fig. (1852).—Bland, Ann. N. Y. Lyc. VII, 26, fig. (1858).—W. G. Binney, Terr. Moll. IV, 73.

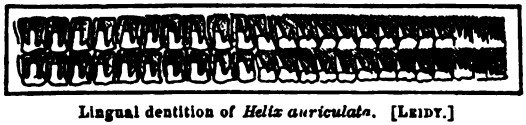
Dædalochila auriculata, Tryon, Am. Journ. Conch. III, 157, pl. xi, f. 13, 14 (1867).

St. Augustine, Florida.

H. auriculata may be distinguished from the allied species by its larger size, the greater development of the several parts of its curious aperture, and especially by the sudden outward deflexure of the central part of the labrum, which has a deep scrobiculation behind it, corresponding with the upper tooth within the aperture. The portion of the labium extending from the inferior angle of the parietal intruded tooth is erect, and more elevated than in any other of the species.

Lingual membrane with — rows of 22—1—22 teeth each;

Fig. 158.



Lingual dentition of *Helix auriculata*. [Leidy.]

centrals tricuspid, the side cusps very short; laterals of the same shape but bicuspid; uncini with two or more sharp points.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
5644	4	St. Augustine, Fla.	O. M. Dorman.	Cab. series.

Helix uvulifera. Shuttleworth.—Shell rimately perforated, flat above, inflated below, striated, reddish horn-color or brownish, rather solid, shining; whirls five, slowly increasing, narrow, the last abruptly deflected

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at the aperture, devious below, constricted and scrobiculated; aperture very oblique, ear-shaped, ringent, very much narrowed; peristome acute, patulously reflected, its terminations joined by an oblong, tongue-shaped, deeply entering, excavated fold, its right margin with a deeply seated lamella terminating in a reflected, filiform uvula-like point, the basal margin with an oblique, sinuose tooth-like tubercle. Greater diam. 12, lesser 11; height 7 mill.

Fig. 159.

Helix uvulifera, enlarged.

Helix uvulifera, SHUTTLEWORTH, Bern. Mitt. 1852, 199.—CHEMNITZ, ed. 2, II, 420, pl. cxlviii, f. 19, 20 (1853).—GOULD, Terr. Moll. III, 20.—W. G. BINNEY, Terr. Moll. IV, 75 (fig.).—PFEIFFER, Mon. Hel. Viv. III, 267.—BLAND, Ann. N. Y. Lyc. N. H. VII, 34, f. 13 (1858).

Helix florulifera, REEVE, Con. Icon. no. 699 (Aug. 1852).

Helix auriculata, minor, FERUSSAC, Hist. pl. 1, f. 3? (teste PFEIFFER).

Dædalochila uvulifera, TRYON, Am. Journ. Conch. III, 157, pl. xi, f. 15, 16 (1867).

Found plentifully on the Florida Keys. As I also have specimens from Corpus Christi, it probably inhabits the whole Gulf coast.

H. uvulifera may be distinguished from *H. auriculata* by the character of the peristome, which is equally produced from the superior angle of the parietal process, to the base of the inferior tooth or fold, where it is reflected, sometimes appressed to the last whirl. The lower angle of the parietal process is connected with the inner termination of the peristome by a flat, more or less developed callus. The umbilical region is less open, and there is no groove within it on the last whirl.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8646	8	Florida.	W. G. Binney.	Cab. series.
8766	33	"	W. Stimpson.	.....

Helix auriformis, BLAND.—Shell rimately perforate, above depressed, with rib-like striæ, beneath inflated, convex, almost smooth, and with microscopic spiral lines; white, or brown horn-color, thin; spire very short; whirls five and a half to six, rather flat, the last deflected, and shortly turned outwards from the preceding whirl, constricted, scarcely scrobiculate; aperture sub-horizontal, ear-shaped, contracted; peristome acute, continuous, the margins joined by a short linguiform fold, entering within the aperture; the right

Fig. 160.

Helix auriformis. [BLAND.]

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margin with an obtuse submarginal lamella, and the base with an oblique sinuous, tooth-like fold. Greater diam. 11½, lesser 10; height 6 mill.

Helix auriformis, Bland, Ann. N. Y. Lyc. VII, 37, fig. (1858).

Helix auriculata, Binney, Bost. Journ. Nat. Hist. (ex parte,) pl. xix, f. 2 (1840); Terr. Moll. II, 186 (ex parte), pl. xl, f. 1 (right hand), 2. —Reeve, Con. Icon. 700.—Deshayes in Fer. Hist. var. *minor*, pl. l, f. 3.

Helix avara, Chemnitz, ed. 2, 370 (ex parte), t. lxv, f. 1–2.—Pfeiffer, Mon. Hel. Viv. I, 418.—Reeve, Con. Icon. 720.

? *Helix sayii*, Wood, Ind. Suppl. pl. vii, f. 34; ed. Hanley, 228, f. 34.—DeKay, N. Y. Moll. 47.

Dædalochila auriformis, Tryon, Am. Journ. Conch. III, 155, pl. xi, f. 1–3 (1867).

From Texas to Georgia it is an extremely common species. Immense beds of semi-fossil specimens are found in middle Alabama.

This species is common in American cabinets, and usually labelled *H. avara*, or var. of *H. auriculata*, but it appears entirely distinct. It is most nearly allied to the former, but is larger, not hirsute, and has the groove in the last whirl within the umbilical region like the latter. The parietal fold is somewhat similar to, but does not descend so far into the aperture as that of *H. postelliana*, but the teeth on the labrum are in form and position, though more developed, rather like those of *H. avara*. They are separated by the same deep sinus, but the upper one generally without the sharp reflexed hook at its termination.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8030	8	Alabama.	W. G. Binney.	.....
5626	6	"	T. Bland.	Cab. series.

Helix postelliana, Bland.—Shell rimately perforate, above slightly convex, with rib-like striæ wider apart and more prominent behind the aperture; beneath inflated, convex, almost smooth, and with microscopic spiral lines: brown horn-color, thin, shining, subpellucid; whirls five, gradually increasing, rather convex, the last deflected and turned outwards from the preceding one, scrobiculate, constricted, grooved within the umbilical region; suture impressed; aperture oblique, ear-shaped, contracted; peristome white, acute, continuous, the margins joined by a tongue-shaped fold, excavated

Fig. 161.

Helix postelliana, enlarged. [Bland.]

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above, entering into the aperture, the right margin having a deeply-seated lamella, which terminates in a reflexed hook, the base with an erect lamelliform, scarcely oblique tooth, produced into, and recurved within the aperture. Greater diam. 9½, lesser 8½; height 5 mill.

Helix postelliana, BLAND, Ann. N. Y. Lyc. VII, 35, fig. (1858).
Dædalochila postelliana, TRYON, Am. Journ. Conch. III, 156, pl. xi, f. 10–12 (1867).

Georgia.

It is smaller than *H. auriculata*, and the rib-like striæ which cover the whole of that shell, are scarcely developed at the base. The form of the parietal process is very like that of *H. uvulifera*, but the continuation of its inferior angle to the inner termination of the peristome is not prostrate as in that species, but erect as in *H. auriculata*. The position and form of the upper tooth on the peristome is much the same as in that species, and in *H. uvulifera*, but the lower one is entirely different. In those it is an oblique, strongly developed, convex, sinuous fold on the margin of the peristome, not descending into the aperture, there being within a slight thickening only, corresponding with the lower exterior apertural depression. In *H. postelliana* there is at the base of the peristome a thin, erect, oblong, lamelliform tooth, rather oblique, but more closely marginal than the fold in the other species. The exterior of this tooth is convex, within concave; it is 1 mill. in height, and 1½ in length, and descends rapidly into the aperture, where it is recurved, and terminates obtusely opposite to the lower end of the superior tooth, there being a very distinct and tortuous sinus between the two. In opening specimens from different localities, these characters are found to be constant.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8647	2	Georgia.	T. Bland.	Cab. series.

Helix espiloca, RAVENEL.—Shell rimately perforate, above slightly convex, beneath convex, striated, reddish horn-color, thin, with very short hairs; spire scarcely elevated; whirls five, rather convex, the last deflected and turned outwards from the preceding one, scrobiculate, constricted, grooved within the umbilical region; aperture very oblique, subreniform, contracted; peristome acute, continuous, the margins joined by a lamella, excavated above, and produced into a tongue-shaped tooth;

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the right margin having a broad hooked lamella, and the base an erect lamelliform tooth produced into and recurved within the aperture. Greater diam. 9, lesser 8; height 4 mill.

Fig. 162.

Helix espiloca.

Helix espiloca, RAVENEL, MS., BLAND, Ann. N. Y. Lyc. VII, 115, pl. iv, f. 1, 2.

Dædalochila espiloca, TRYON, Am. Journ. Conch. III, 156, pl. xi, f. 7–9 (1867).

Sullivan's Island, South Carolina.

In the form of the parietal process, it is intermediate between *H. postelliana* and *H. avara*, but most like the latter; the teeth on the peristome are very similar to those in the former, but beneath it is less inflated, the umbilical region is wider, showing more of the penultimate whirl, and it is hirsute.

Helix avara, SAY.—Shell rimately umbilicated, depressed-convex above, convex below, striated, especially near the aperture, horn-colored, thin, covered with numerous short, robust hairs; spire convex, not much elevated; whirls four, rounded, the last more convex, constricted behind the peristome, not grooved within the moderate umbilicus; aperture very oblique, subreniform, contracted; peristome white, acute, elevated, continuous, its terminations connected by an elevated, oblique angular fold; the columellar margin furnished with two projecting, obtuse, curved teeth, separated by a deep sinus. Greater diam. 7, lesser 6; height 3 mill.

Fig. 163.

Helix avara,[1] enlarged.

Polygyra avara, SAY, Nich. Encycl. 3d Am. ed. (1819); Journ. Phila. Acad. I, 277 (1818); ed. BINNEY, 11.—DEKAY, N. Y. Moll. 47 (1843).

Helix avara, FERUSSAC, Hist. pl. 1, f. 2.—PFEIFFER, var. *β. minor*, Mon. Hel. Viv. I, 418 (ex parte).—DESHAYES in FER. Hist. II, 78, pl. 1, f. 2.—CHEMNITZ, ed. II, 370 (ex parte), excl. fig.—REEVE, Con. Icon. (ex parte), no. 720, excl. fig.—BLAND, Ann. N. Y. Lyc. VII, 30, fig. (1858).—W. G. BINNEY, Terr. Moll. IV, 74.

Dædalochila avara, TRYON, Am. Journ. Conch. III, 155, pl. xi, f. 4–6 (1867).

St. John's River, Florida.

H. avara, Say, may be readily distinguished by its smaller size, more delicate texture, and less globose form—it has from four to four and a half whirls, and is the only species of the group which is hirsute, except *H. espiloca*. The superior tooth on the

[1] The *striæ* in Fig. 163 are incorrectly represented: they should have been shown only at the termination of the last whirl, over a small space immediately behind the peristome.

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peristome is armed with a hook as in the other species, but is narrower, less deeply seated, and more erect; the inferior one is rather a distinct tooth than a lamellar fold. The parietal process differs entirely from that of *H. auriculata*, as plainly shown in the figure. *H. avara* is without the groove on the last whirl which prevails in *auriculata*, and the forms represented by Dr. Binney as varieties of it. It is very rare in collections: I know of but two specimens of it.

Helix ventrosula, PFEIFFER.—Shell rimately perforated, globosely depressed, thin and shining, pellucid, delicately striated, horn-colored; spire slightly raised; whirls five, but little convex, the last one subangulated above, falling suddenly towards the aperture, inflated below, anteriorly gibbous and contracted; aperture very oblique, ringent; peristome acute, broadly reflected, its terminations scarcely approaching each other, but joined by two white, elevated laminæ, which are placed at acute angles on the parietal wall; the basal margin is also furnished with two white acute denticles; on the right margin is placed a white sub-perpendicular, extended lamina. Greater diam. 13, lesser 11; height 7½ mill.

Fig. 164.

Helix ventrosula.

Helix ventrosula, PFEIFFER, Proc. Zool. Soc. 1845, 131; Mon. Hel. Viv. I, 417; in CHEMNITZ, ed. 2, I, 373 (1846), pl. lxv, f. 5, 6 (1849).—REEVE, Con. Icon. no. 687 (1852).—W. G. BINNEY, Terr. Moll. IV, 73, pl. lxxvii, f. 14.

Dædalochila ventrosula, TRYON, Am. Journ. Conch. III, 63, pl. x, f. 35, 39 (1867).

Texas and Mexico. The specimen which furnished Figs. 165 and 166 is from the Sierra Madre.

Fig. 165.

Jaw of *Helix ventrosula.*

Jaw strongly arcuate, of uniform width, ends blunt, anterior surface with broad ribs, crenulating both margins.

Lingual membrane with 93 rows of 24—1—24 teeth each; centrals tricuspid, the side cusps very small; laterals of same shape, but bicuspid; uncini irregularly and bluntly serrate.

Fig. 166.

Lingual dentition of *Helix ventrosula.*

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Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9329	7	Colima, Sierra Madre.	Xantus.	.....

Helix hindsi, PFEIFFER.—Shell narrowly umbilicated, depressed, delicately striate, brownish horn-color, diaphanous, thin, shining; spire slightly elevated; whirls five, flattened, the last deflected at the aperture, more convex and constricted below; umbilicus pervious; aperture very oblique, lunate, ringent; peristome slightly reflected, its terminations converging, joined by a triangular, tooth-like, two-forked callus, the right hand margin with one sub-vertical lamina, the columellar margin with two acute denticles. Greater diam. 8, lesser 7; height 4½ mill.

Fig. 167.

Helix hindsi.

Helix hindsi, PFEIFFER, in Proc. Zool. Soc. 1845, 132; Mon. Hel. Viv. I, 416; in CHEMNITZ, 2d ed. I, 373, tab. lxv, f. 7, 8.—REEVE, Con. Icon. 712 (1852).—GOULD, in Terr. Moll. III, 17.—W. G. BINNEY, Ter. Moll. IV, 92, pl. lxxviii, f. 5, 6, 8.
Dædalochila hindsi, TRYON, Am. Journ. Conch. III, 63, pl. x, f. 24, 44 (1867).

Texas and Mexico.

Helix texasiana, MORICAND.—Shell rimately perforated, depressed, orbicular, rather solid, of a pale horn-color, sometimes with a revolving rufous band, with crowded rib-striæ above, smooth, or faintly striated, and shining beneath; spire nearly flat, of five whirls separated by a well-marked suture, the outer one obtusely angular at periphery, nearly at the plane of the spire, and somewhat deflected near the aperture; beneath convexly rounded, with a somewhat distorted appearance in consequence of the whirl becoming narrower, rather than broader, towards the aperture, leaving a minute umbilical perforation; aperture very oblique, narrow lunate, the peristome forming about two-thirds of a circle, reflected, white, with a constriction behind it, and armed with two denticles at its inner margin, one near the centre, the other at the middle of the basal portion; the extremities of the peristome connected by a callus across the columella, of an acutely angular form, pointing to the middle of the portion of the peristome above the upper denticle, the lower ramus of the angle being longest and largest, and a little concave inwardly. Greater diam. 10, lesser 8½; height 5 mill.

Fig. 168.

Helix texasiana.

Helix texasiana, MORICAND, Mem. Soc. Phys. Hist. Nat. de Géneve, VI, 538, pl. i, f. 2 (1833).—DESHAYES in LAMARCK, VIII, 133; ed. 3, III, 316; in FER. I, 74, pl. 1, c (excl. syn.).—FERUSSAC, Hist. des Moll. pl. lxix, D, f. 2.—PFEIFFER, Mon. Hel. Viv. I, 418, excl. syn. and var. β; vol. IV, 318.—CHEMNITZ, ed. 2 (1846), I, 85, excl. var.

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and figure.—Reeve, Con. Icon. no. 707.—Binney, Terr. Moll. II, 191, pl. xlv, f. 1.—W. G. Binney, Terr. Moll. IV, 79.

Helix auriculata, Binney, Bost. Journ. Nat. Hist. III, 387.

Helix tamaulipasensis, Lea, Proc. Acad. Nat. Sci. Philad. 1857, 102; Journ.—; Obs. XI, 139, pl. xxiv, f. 113.

Dædalochila texasiana, Tryon, Am. Journ. Conch. III, 62, pl. x, f. 5, 36, 38 (1867).

Texas and the neighboring Mexican State of Tamaulipas.

There is a variety larger, with six whirls, and with a brown band revolving above the periphery.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7923	7	Texas.	Dr. B. F. Shumard.	.....
7924	16	Tamaulipas, Mex.	Lieut. Couch.	(*H. tamaulipasensis*, Lea, came from this Cab. series. [lot.)
8006	27	Texas.	"	
8616	9	"	"	.....
8669	3	.....	W. G. Binney.	Cab. series.
8731	2|0?	Texas.	G. Wurdemann.	.....
8980		San Felipe Spr.	Lieut. Beale.	.....

Helix triodontoides, Bland.—Shell umbilicated, globose-depressed, thin, subpellucid, pale horn-colored, with partially obsolete rib-like striæ above; base convex, smooth; spire short; whirls five, somewhat convex, the last plicately ribbed near the aperture, deflexed anteriorly; aperture roundly lunate, oblique, contracted; peristome reflected, callous, the margins joined by a sharp linguiform triangular tooth, the right with a tooth on the margin of the callus, basal with an oblique tooth, both teeth small and far apart. Greater diam. 9½, lesser 8; height 5 mill.

Fig. 169.

Helix triodontoides.

Helix triodontoides, Bland, Ann. N. Y. Lyc. VII, 424, pl. iv, f. 11, 12 (1861).

Helix texasiana, W. G. Binney, Terr. Moll. IV, 79, pl. lxxviii, f. 18.

Dædalochila triodontoides, Tryon, Am. Journ. Conch. III, 62, pl. x, f. 10, 31 (1867).

Corpus Christi and De Witt Co., Texas.

H. triodontoides is a more delicate shell than *H. texasiana*, and does not attain the same size. It is not as distinctly ribbed, is somewhat more elevated, and the aperture is more round. The last whirl is less devious at its termination beneath, the peristome teeth are smaller and wide apart. In *H. texasiana* they are close together, and the space between them has much resemblance to the notch in *H. hirsuta*. In that respect, as well as in the form of the aperture, Moricand's shell is more closely allied to *H. mooreana*, W. G. Binn.

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Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9360	1	Texas.	W. G. Binney.	.....

Helix mooreana, W. G. Binn.—Shell umbilicated, orbicular, globose, white, subcarinated; spire more or less depressed, obtusely rounded; whirls six, distinctly striated, hardly convex; suture impressed; below the carina the body-whirl is not rounded, but slants down to the base which is parallel with the suture; below, the striæ are less distinct; at the umbilical region only one and a quarter whirl is visible, the outer one strongly carinated so as to conceal a portion of the umbilicus and a great part of the remaining whirl; the umbilicus is very small, but perforates the shell to the apex, showing all the volutions with the aid of a lens; aperture rounded, contracted by three teeth; peristome heavy, broad, white, hardly reflected, near the basal extremity, quite on the edge, armed with two short, incurving teeth, separated by a small, rounded sinus; on the columella there is a tooth-like fold, square, projecting across the aperture, its extremities joining those of the peristome; an internal transverse tubercle on the base of the shell. Greater diam. 8½, lesser 7; height 3 mill.

Fig. 170.

Helix mooreana, enlarged.

Helix mooreana, W. G. Binney, Proc. Acad. Nat. Sci. Philad. 1857, 184; Terr. Moll. IV, 80, pl. lxxviii, f. 24.—Pfeiffer, Mon. Hel. Viv. IV, 52.
Dædalochila mooreana, Tryon, Am. Journ. Conch. III, 64, pl. x, f. 8 (1867).

Washington Co., Texas. Also in the neighboring Mexican States.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
3670 3984	8	Texas. Leon.	Lieut. Couch. Lieut. Blake.	Cab series. .....

Helix tholus, W. G. Binney.—Shell broadly umbilicated, depressed-globose, rather solid, white, shining, ribbed above, smoother below; spire obtuse, little elevated, rounded; whirls seven, convex, the upper ones more flattened, the last bluntly carinated; carina not reaching the peristome; base parallel to the suture; umbilicus broad, half the larger diameter of the shell, showing two and a half deeply grooved whirls plainly, the others rapidly retreating towards the apex; aperture very oblique, semicircular, removed from the axis of the shell, bordered with a scarcely reflected, white, heavy peristome, grooved behind, and armed with two stout teeth near the basal extremity, broadly reflected at the

Fig. 171.

Helix tholus, enlarged.

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junction with the body whirl; on the parietal wall of the aperture is a white fold, hardly connecting the extremities of the peristome, and projecting across the aperture into an acute point; an internal transverse tubercle on the base of the shell. Greater diam. 11, lesser 9; height 4 mill.

Helix tholus, W. G. BINNEY, Proc. Acad. Nat. Sci. Philad. 1857, 186; Terr. Moll. IV, 81, pl. lxxvii, f. 21.—PFEIFFER, Mon. Helic. Viv. IV, 351.
Dædalochila tholus, TRYON, Am. Journ. Conch. III, 64, pl. x, f. 7, 9 (1867).

Washington Co., Texas.

The specimens from which the descriptions of *H. mooreana* and *H. tholus* were drawn are widely different, but a study of a large suite of individuals leads to doubt their specific distinction.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8741	2	Texas.	W. G. Binney.	Cab. series.

Helix hippocrepis, PFEIFFER.—Shell rimately perforated, depressed, rather heavy, closely striated, opaque, smoky; spire flattened; suture impressed; whirls five and a half, narrow, scarcely convex, the last subcarinated above, more convex below, falling abruptly at the aperture, and behind it very much contracted and with a prominent isolated bulge; umbilicus at first expanded and grooved, but rapidly terminating in a minute perforation; aperture almost horizontal, ear-shaped, ringent, complicated with teeth; peristome white, thickened, its extremities joined by an elevated, sharp, angular ridge, from which protrude far within the aperture two laminæ (the upper one sharper and more prominent), the connecting terminations of which within the shell resemble a horseshoe; the upper portion of the peristome is slightly reflected and furnished with an oblique entering angle, and the basal portion is callous and reflected; an internal transverse tubercle on the base of the shell. Greater diam. 12, lesser 10; height 5 mill.

Fig. 172.

Helix hippocrepis.

Helix hippocrepis, PFEIFFER in RÖMER's Texas, 455 (1849); in Zeitsch. f. Mal. 1848, 119; Mon. Hel. Viv. III, 267; in CHEMNITZ, ed. 2, II, 333, pl. cxxxi, f. 4–6.—REEVE, Con. Icon. no. 1238 (1854).—W. G. BINNEY, Terr. Moll. IV, 77, pl. lxxviii, f. 19.
Dædalochila (?) *hippocrepis*, TRYON, Am. Journ. Conch. III, 68, pl. x, f. 42 (1867).

New Braunfels, Texas.

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Helix fastigans, L. W. SAY.—Shell rimately perforated, plane above, inflated below, with fold-like striæ above, smoother below, somewhat shining, of a russet horn-color, hirsute; spire flattened; whirls six and a half, flattened, the last acutely carinated above, very abruptly deflected at the aperture, scrobiculated, constricted, convex below; aperture very oblique, subreniform, very much contracted, tridentate; within the base of the last whirl is a small, detached, erect, rounded tubercle; peristome white, reflected, its terminations joined by a stout, subtriangular, excavated, deeply entering tooth, the right hand margin with a stout, deeply-seated tooth, the columellar margin with a submarginal, smaller tooth. Greater diam. 10, lesser 9; height about 4 mill.

Fig. 173.

Helix fastigans.

Polygyra fatigiata, SAY, N. Harm. Diss. II, 229 (1829); ed. BINNEY, 37.

Helix fatigiata, BINNEY in Bost. Journ. Nat. Hist. III, 388 (1840), ex parte (excl. syn. et fig.); Terr. Moll. II, 193 (pars), pl. xxxix, f. 4 (excl. syn.).—SHUTTLEWORTH, Bern. Mitt. 1852, 197.—BLAND, N. Y. Lyc. VI, 283, pl. ix, f. 17–20 (1858).—W. G. BINNEY, Terr. Moll. IV, 82.—PFEIFFER, Mon. Hel. Viv. IV, 318.

Helix texasiana, β, PFEIFFER, Mon. Hel. Viv. I, 418; III, 267; in CHEMNITZ, ed. 2, I, 86, excl. descr., syn., et fig.—DESHAYES in FER. I, 74, excl. descr., syn., et fig.

Helix dorfeuilliana, DESHAYES in FER. I, 73 (excl. syn.), pl. lxix, D, f. 3, not of LEA.

Helicina fastigiata, DEKAY, N. Y. Moll. 82 (1843).

Helix fastigans, L. W. SAY MS. in BLAND, Ann. N. Y. Lyc. VII, 140.

Dædalochila fastigans, TRYON, Am. Journ. Conch. III, 67, pl. x, f. 22, 23, 26 (1867).

Tennessee at Clarkeville and Nashville.

H. fastigans is larger than *troostiana, hazardi,* and *dorfeuilliana;* it is most nearly allied to the first, and though it is connected with the second, is wholly distinct from the last. The parietal tooth is more rectangular than that of *troostiana,* in which it is slightly emarginate near the tip—but much more so in *hazardi,* while the parietal tooth in *dorfeuilliana* is rather quadrate. The teeth on the peristome in *fastigans* and *troostiana* are much alike, as regards form, size, and position—the superior one being the largest—both are larger and transverse in *dorfeuilliana* and in *hazardi,* the inferior one being the largest in the latter. Behind the peristome there are two small pits, showing the situation of the teeth in *fastigans* and *troostiana,* while there is scarcely more than a deep, well-marked constriction in *dorfeuilli-*

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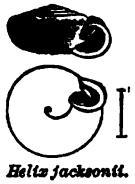
ana. *H. troostiana* has a slight groove on the inner side of the last whirl, the absence of which in *fastigans* is noticed by Say, but I scarcely consider that a good specific character. Fresh specimens of *H. fastigans* are, I believe, covered with a very thin epidermis, on which hairs are sparingly scattered,—the scars of the hairs may be detected, especially on the last whirl, in denuded shells.

Helix jacksonii, BLAND.—Shell narrowly umbilicate, depressed, shining, dark or pale horn-colored, little elevated above, striated, convex beneath, with finer almost obsolete striæ; whirls six, slightly convex, gradually increasing, the last suddenly deflected, contracted and above gibbously inflated behind the aperture; suture impressed; aperture oblique, lunate-circular, with three teeth; peristome thickened, brownish-red, shortly reflected, with the scarcely approaching margins joined by a white, linguiform, bicrural, deeply entering tooth, the basal margin with a strong, oblique, sinuous fold, the right with a deeply seated tooth. Greater diam. 7, lesser 6; height 4 mill.

Fig. 174.



Helix jacksonii.

Helix jacksonii, BLAND, Am. Journ. Conch. II, 371, pl. xxi, f. 8 (1866).
Dædalochila jacksonii, TRYON, Am. Journ. Conch. III, 67, pl. x, f. 32, 33, 34 (1867).

Fort Gibson, Indian (Cherokee) Territory.

Most nearly allied to *Helix hazardi,* but readily distinguished by the very different character of the parietal and basal teeth. The species has no internal tubercle.

Fig. 175.

Helix troostiana, enlarged.

Helix troostiana, LEA.—Shell rimately umbilicated, discoidal, slightly convex above, flattened below, obtusely carinated, with separated strong rib-like striæ throughout,[1] hirsute, russet horn-color; spire not much elevated; whirls five and a half, flattened, the last more convex, descending at the aperture, grooved behind the peristome, with a smoother bulge, below plane, widely rimated and ending in a small umbilicus; aperture oblique, subreniform, very much contracted, far within on the base of the outer whirl with a small, detached, erect, rounded tubercle; peristome white, thickened, continuous, ends approached, joined by an excavated, emarginate, somewhat flexuose,

[1] Some of the striæ extend over the carina on to the base of the shell without being carried into the umbilicus.

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slightly entering, tongue-like, heavy callus, the basal margin with a submarginal obtuse stout denticle, right margin with a more deeply seated, broader denticle. Greater diam. 9, lesser 8; height 3 mill.

Polygyra troostiana, Lea, Tr. Am. Phil. Soc. VI, 107, pl. xxiv, f. 119; Obs. II, 107 (1839).—Troschel, Arch. f. Nat. 1839, III, 222.

Helix troostiana, Pfeiffer, Mon. Hel. Viv. I, 419, excl. syn. et var.; in Chemnitz, ed. 2, I, 376, pl. lxv, f. 21–24.—Deshayes in Fer. I, 75, pl. lxix, d, f. 4?—Reeve, Con. Icon. no. 706 (1852).—W. G. Binney, Terr. Moll. IV, 88, pl. lxxviii, f. 11.—Bland, Ann. N. Y. Lyc. VI, 288, pl. ix, f. 21–23 (1858).

Helix fatigiata, Binney, Bost. Journ. Nat. Hist. III, 388, pl. xix, f. 3, part, excl. syn.; in Terr. Moll. part, II, 193, pl. xxxix, f. 2.

Helix plicata, Binney (not of Say), Terr. Moll. pl. xxxix, f. 2, not text.

Dædalochila troostiana, Tryon, Am. Journ. Conch. III, 67, pl. x, f. 19, 25 (1867).

Murfreesboro', Tennessee.

H. troostiana is most nearly allied to *H. fastigans*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8671	1	.....	W. G. Binney.	Cab. series.

Helix hazardi, Bland.—Shell rimately umbilicated, discoidal, depressed above, convex below, light horn-color, sparingly hirsute, with separated rib-like striæ; spire planulate; whirls five, gradually increasing, the upper ones rounded, smoother, the last convex, plane below, scrobiculated and with an insulated, smooth, prominent bulge behind the peristome, deflected at the aperture; rimation level, at first grooved, showing one and a half whirls, and ending in a narrow umbilicus; aperture subreniform, very oblique, contracted; peristome white, thickened, not reflected, continuous, its terminations approached, joined by a prominent, excavated, heavy, somewhat flexuose, emarginate, tongue-like callus, projecting almost across the aperture; within the columellar margin of the peristome is an erect, blunt, stout denticle (its inner end continued back within the aperture into an erect lamella joining the inner wall) somewhat overlapping and thus partially concealing from view a smaller, more deeply seated, erect, obtuse, stout denticle on the right margin of the peristome; an internal transverse tubercle on the base of the shell. Greater diam. 7, lesser 6; height 3 mill.

Fig. 176.

Helix hazardi, enlarged.

Polygyra plicata, Say, Journ. Acad. Phila. II, 161 (1821); ed. Binney, 21.

Helix fatigiata, Binney in Bost. Journ. Nat. Hist. III, 388 (1840), part (excl. syn, and fig.); in Terr. Moll. part (excl. syn. and fig.).

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Helix terasiana, PFEIFFER, Mon. Hel. Viv. I, 418 (excl. syn. and descr.); in CHEMNITZ, I, 85 (excl. syn., descr., and fig.).
Helix dorfeuilliana, DESHAYES in FER. I, 73 (excl. descr., syn., and fig.).
Helix troostiana, PFEIFFER, Mon. Hel. Viv. IV, 318, part.
Helix hazardi, BLAND, Ann. N. Y. Lyc. VI, 291, pl. ix, f. 27–30 (1858).—PFEIFFER, Mal. Blatt. 1859, 34.—W. G. BINNEY, Terr. Moll. IV, 84, pl. lxxviii, f. 13.
Helix finitima, DESHAYES in FER.?
Helicina plicata, DEKAY, N. Y. Moll. 82 (1843).
Dædalochila hazardi, TRYON, Am. Journ. Conch. III, 68, pl. x, f. 27–29 (1867).

Alabama (Tuscumbia), Kentucky (near Frankfort), Georgia, and Tennessee (Cumberland Mts.).

This shell may be distinguished from *fastigans* and *troostiana* independently of the absence of the carina, by its smaller size, and more particularly by the different form, relative size, and position of the teeth. In those species the superior tooth on the peristome is transverse, compressed, and larger than the inferior one, from which it is separated by a "remarkable sinus," distinctly visible on looking into the aperture; the inferior tooth is obtuse. Immediately behind the peristome, the position of the teeth is marked by small shallow pits, giving the character to the last whirl designated by Shuttleworth "*scrobiculato-constrictus*," and the striæ run over the whirl up to the peristome. In *H. hazardi*, the two teeth within the peristome are of the same character as the superior one in *fastigans* and *troostiana;* the inferior tooth is however the largest, and so partially conceals the lower margin of the superior one as to obstruct the view into the aperture, and give no appearance of separation "by a remarkable sinus." Both the teeth are more deeply seated than in the other species. The nature of the scrobiculation behind the peristome in *H. hazardi* alone sufficiently distinguishes it from its allies. The space behind the peristome, and between it and the curved pit, showing the seat of the superior tooth, is convex and smooth, the striæ not extending over it.

This species has, in common with *fastigans* and *troostiana*, a thin, brown, but more sparingly hirsute epidermis. I have noticed the tubercle within the last whirl, near the aperture, in *fastigans* and *troostiana*, but no such process exists in the species now under consideration. In *H. hazardi*, the inferior tooth of the peristome, at its inner end, is continued back within the

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aperture, forming a white erect lamella on the floor of the whirl, parallel with, and leaving a narrow sinus between it and the inner wall, to which it is joined at its extremity, about two and a half mill. from the edge of the peristome. The position of this lamella can be seen through the shell.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8672	1	.....	W. G. Binney.	Cab. series.
8839	3	.....	Lieut. Kurtz.	.....

Helix oppilata, MORICAND.—Shell umbilicated, depressed, delicately striate, subpellucid, light horn-color or white; spire scarcely elevated; whirls five, rather convex, gradually increasing, the last deflected at the aperture, inflated below, constricted behind the peristome; umbilicus at first widened, then narrow, pervious; aperture diagonal, lunately-circular, ringent; peristome briefly reflected, its terminations joined by a tongue-shaped, entering, two-forked callus, the right margin subequally bidentate. Greater diameter 7, lesser 6; height 3 mill.

Fig. 177.

Helix oppilata.

Helix oppilata, MORICAND, Test. Noviss. I, 8.—PFEIFFER, Mon. Hel. Viv. III, 264; IV, 314.

The specimen figured is not American, nor have I known of any having been found out of Yucatan, but Pfeiffer on Shuttleworth's authority refers to Florida a var. β with a somewhat more elevated spire, five and a half whirls and 8⅔ mill. in the greater diameter.

Helix dorfeuilliana, LEA.—Shell rimately umbilicated, discoidal, slightly convex above, flattened below, light horn-colored, striated, below smoother and with minute revolving lines; spire not much elevated; whirls six, flattened, gradually increasing, the last more convex, inflated below, constricted behind the peristome, descending at the aperture, below with a grooved rimation of one and a half whirls, ending in a very small umbilicus; aperture oblique, subreniform, contracted, far within furnished with a deeply seated, erect tubercle on the base of the last whirl; peristome white, very much thickened, not reflected, continuous, its terminations but slightly approached, joined by a heavy, excavated, subquadrate callus projecting across the aperture, the columellar margin with a deeply seated, transverse, somewhat pointed denticle, distinctly separated from a broader, equally deeply-seated

Fig. 178.

Helix dorfeuilliana, enlarged.

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obtuse denticle on the right margin. Greater diam. 8, lesser 7; height 3½ mill.

Polygyra dorfeuilliana, Lea, Trans. Am. Phil. Soc. VI, 107, pl. xxiv, f. 118; Obs. II, 107 (1839); Troschel's Arch. f. Nat. 1839, II, 222.

Helix dorfeuilliana, Bland, Ann. N. Y. Lyc. (1858), VI, 294, pl. ix, f. 24-26.—W. G. Binney, Terr. Moll. IV, 86, pl. lxxviii, f. 2, 14, not of Pfeiffer, Deshayes, Chemnitz, Reeve.

Helix fatigiata, Binney, Bost. Journ. Nat. Hist. III, 388 (1840); Terr. Moll. II, 193 (excl. descr., syn., and fig.).

Helix troostiana, var.? Pfeiffer, Mon. Hel. Viv. III, 318, no descr.

Dædalochila dorfeuilliana, Tryon, Am. Journ. Conch. III, 66, pl. x, f. 20, 21 (1867).

Washington County, Texas; Washita Springs, Ark.; Coosa River, Ala.; Kentucky, opposite Cincinnati. It thus appears much more widely distributed than the allied species.

H. dorfeuilliana differs materially in its characters from the allied species; the striæ on the upper surface are not so well defined as in *troostiana*, but more so than in *hazardi*, while the base is more smooth than in either of them, having only very delicate striæ, with microscopic impressed spiral lines. The parietal tooth is quadrate—the two teeth on the peristome are more nearly of the same size and form than in *fastigans* and *troostiana*. In this species the inferior tooth is transverse, and in some specimens broader than the superior one, but has a somewhat pointed apex; both are very nearly equally deeply seated, but so far apart as to allow a view between them into the aperture, leaving, as Mr. Lea expresses it, "to appearance three nearly square apertures." Say would have described the two teeth as "separated by a remarkable sinus." The peristome of this is more thickened and less reflected than in the other species; behind it is deeply constricted, without any appearance of pits showing the position of the teeth within.

There is a form of *H. dorfeuilliana* which differs from the type in that the superior tooth on the peristome is larger and more deeply seated than the inferior one, and that the latter, though more developed, is much of the same form as the inferior tooth in *fastigans* and *troostiana*. The parietal tooth partakes of the general character of that in Lea's type of *dorfeuilliana*, but its lower and terminal margins project more perpendicularly from the parietal wall. The umbilical perforation is also larger, and the base of the shell is more smooth. The following are the

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measurements of a large specimen: Greater diam. 9, lesser 8; height 4 mill. I am much inclined to consider this a distinct species, but remark upon it, as I believe it is more commonly found in cabinets under the name of *dorfeuilliana*, than the shell described by Lea.

H. dorfeuilliana, and also the shell last considered, have a tubercle within the aperture very similar to that in *fastigans* and *troostiana*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8826	2	Texas.	W. G. Binney.	Cab. series.
8957		Hot Spr., Ark.	Dr. B. Powell.	.....

Helix acutedentata, W. G. Binney.—Shell rimately umbilicated, discoidal, equally flattened above and below, white, smooth, shining; spire very short, scarcely elevated, sunken, the apex about on a level with the top of the last whirl; whirls six, the upper five gradually increasing, the last very large, inflated, descending towards the aperture, below inflated, rimate, showing only one and a half volutions, and with a small deep umbilicus; aperture small, very oblique, subreniform; peristome white, thickened, acute, subreflected in its whole circuit, its ends approached, joined and made continuous by a heavy white, emarginate, excavated, prominent callus on the parietal wall, extending almost across the aperture, its columellar margin with one or two short, perpendicular, marginal denticles; within the right hand margin of the aperture are two horizontal lamina-like denticles, one obtuse, the upper raised at its end into an acute, curved, long, hook-like point; behind the peristome on the outer surface of the last whirl the position of these laminæ is marked by two pits, between which the shell is pinched into a sharp ridge joining the peristome. Greater diam. 14, lesser 11; height 4 mill.

Fig. 179.

Helix acutedentata.

Helix acutedentata, W. G. Binney, Proc. Acad. Nat. Sci. Philad. 1857, 183; Terr. Moll. U. S. IV, 23, pl. lxxvi, f. 1.—Pfeiffer, Mon. Hel. Viv. IV, 351.

Helix loisa, W. G. Binney, Proc. Acad. Nat. Sci. Philad. 1857, 183; Terr. Moll. U. S. IV, 23, pl. lxxvi, f. 2.—Pfeiffer, Mon. Hel. Viv. IV, 351.

Dædalochila acutedentata, Tryon, Am. Journ. Conch. III, 65, pl. x, f. 11, 13 (1867).

Dædalochila loisa, Tryon, *l. c. f.* 12, 14.

Mazatlan and Guaymas.

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Helix ariadnæ, Pfr.—Shell with an arcuate rimation, terminating in a minute oblique perforation, depressed, subdiscoidal, rather solid, nearly transparent, bluish-white, with scarcely perceptible wrinkles on the upper surface; spire flattened; whirls five, separated by a distinct suture, flattened, the last one suddenly falling towards the aperture, very much contracted and pinched behind the peristome, more convex and smoother below; there is a deeply chiselled, arcuated, umbilical rimation, the umbilical region is also channelled; aperture small, extremely complicated with teeth, very oblique, lunately circular, ringent; peristome white, slightly reflected, its terminations approaching each other and joined by two flexuose, elevated, acute laminæ, converging to a point far within the aperture; the basal margin of the peristome is also furnished with two stout, entering, converging marginal folds, the right margin of the peristome has a more delicate, deeply seated, elongated lamina, running almost parallel with the peristome. Greater diam. 12, lesser 10; height 5 mill.

Fig. 180.

Helix ariadnæ.

Helix ariadnæ, Pfeiffer in Zeitsch. f. Mal. 1848, 120; Mon. Hel. Viv. III, 266; in Chemnitz, ed. 2, I, 372, pl. lxv, f. 19–21 (1846).—W. G. Binney, Terr. Moll. IV, 76, pl. lxxviii, f. 1, 3, 4.

Helix couchiana, Lea, Proc. Acad. Nat. Sci. Philad. 1857, 102; Journ.—; Obs. XI, 139, pl. xxiv, f. 112.

Dædalochila ariadnæ, Tryon, Am. Journ. Conch. III, 66, pl. x, f. 15, 16, 18 (1867).

In the region of the Rio Grande, both in Texas and Tamaulipas.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8648	7	Tamaulipas, M.	Lieut. Couch.	Cab. series.

Helix septemvolva, Say.—Shell broadly umbilicated, subcarinated, discoidal, russet horn-color, with stout striæ above, smooth below; plane above with seven (sometimes eight and a half) or less flattened whirls; equally plane below, with three and a half full, more convex whirls on a level, then ending in a deep, pervious umbilicus, the penultimate somewhat overlapped by the last, the antepenultimate much the largest; aperture very oblique, remote from the axis, subreniform, constricted behind the peristome; peristome thickened, bluntly reflected, continuous, its terminations joined by an elevated, heavy, tooth-like triangular fold. Greater diam. 15, lesser 13; height 4 mill.

Fig. 181.

Helix septemvolva, enlarged.

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Polygyra septemvolva, SAY, Journ. Acad. Nat. Sci. Philad. I, 278 (1818); Nich. Encycl. 3d ed. (1819); BINNEY's ed. 11.—TRYON, Am. Journ. Conch. III, 159, pl. xi, f. 22 (1867).

Helix septemvolva, BINNEY, Terr. Moll. U. S. II, 196 (part), pl. xxxviii, outer figs.; pl. xxix, f. 1.—DEKAY, N. Y. Moll. 47 (1843).—BLAND, Ann. N. Y. Lyc. VII, 131, f. on p. 136.—W. G. BINNEY, Terr. Moll. IV, 89, part.

? *Helix volvoxis*, PFEIFFER, see below.

St. Augustine, Florida.

Animal (see p. 86) brownish, eye-peduncles darker, very long and slender, eyes black; foot narrow, thin, semi-transparent, receiving its color, in some degree, from the substance on which it is placed, not projecting behind the shell when in motion; length less than twice the breadth of the shell, which it carries nearly horizontal.

The shell described and figured above, which is, no doubt, the form called *septemvolva* by Say, is only found, to my knowledge, at St. Augustine, Florida. There are, however, associating with it there, and also found at many other points on the Georgia, Florida, and Alabama coasts, other forms which appear to be varieties of it. It may be said, therefore, that it varies in being occasionally a little convex, more or less carinate, and in exhibiting a greater or less number of full volutions on the base. The lower surface is sometimes marked with the alternate white and brown flammules which characterize *H. carpenteriana*.

The reflected peristome in this shell seems to be formed at various periods of growth, thus creating a greater diversity of size in the apparently mature shell than exists in any other species. From the nucleus until the accomplishment of five full whirls, each whirl on the base is curved a little lower than that which precedes it; and up to this time, consequently, the umbilicus is deep and gradually expanding, exhibiting, when carefully examined, all the volutions. Up to this period, also, the spire is almost always prominent. After five whirls are completed, the succeeding ones usually follow in the same horizontal plane, and give a discoidal character to the shell. It is manifest, therefore, that specimens in each of these stages must present considerable differences; and, accordingly, the small, delicate shell, having a slightly convex spire of five whirls, a deep umbilicus, and a transverse diameter of only one-eighth of an inch,

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forms a beautiful variety, and has been thought to be a distinct species.

The form known as *H. volvoxis* is found on the Atlantic coast of Florida and Georgia. It is thus described by Pfeiffer. The synonymy is also given in full. I believe it to be a variety of *H. septemvolva*:—

Shell umbilicated, orbicularly convex, thin, reddish horn-colored, pellucid, with regular rib-like striæ; spire very short, convex; whirls seven, convex, regularly increasing, the last larger above than the rest, angular, below the angle inflated, striated and shining; umbilicus large, regular, in which the whirls regularly decrease, excepting the last, which is very broad; aperture rather large, kidney-shaped; peristome thickened within, reflected, its terminations joined by a short, triangular, tooth-like callus. Greater diam. 9, lesser 8; height 4 mill.

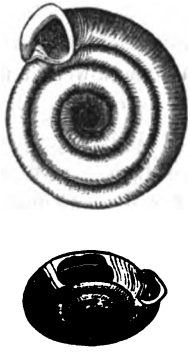
Helix volvoxis, Parreyss in Pfeiffer, Symb. III, 80; Mon. Hel. Viv. I, 409; in Chemnitz, ed. 2, I, 379 (1846), pl. lxvi, f. 4–6 (1849).—Reeve, Con. Icon. no. 1237 (1854).—W. G. Binney, Terr. Moll. U. S. IV, 92, pl. lxxviii, f. 17.—Bland, Ann. N. Y. Lyc. VII, 135.

Polygyra volvoxis, Tryon, Am. Journ. Conch. III, 159, pl. xi, f. 25 (1867).

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8639	4	St. Augustine, Fla.	O. M. Dorman.	.....
8641	11	St. Simon's Island, Ga.	J. Postell.	.....
8775	2	Key West.	W. G. Binney.	(*volvoxis.*)

Helix cereolus, Muhlfeldt.—Shell broadly umbilicated, subcarinated, discoidal, white, scarcely convex and with rib-like striæ above, smooth and plane below; whirls seven or eight, gradually increasing, the last subcarinated, briefly deflected at the aperture, constricted behind the peristome; below three full whirls revolving on the same plane, the balance visible in the broad, pervious umbilicus, the penultimate somewhat lapped over by the last, the antepenultimate the most swollen; aperture remote from the axis, subreniform; peristome white, thickened, acutely reflected, somewhat angular at the carination of the last whirl, continuous, its terminations joined by triangular, elevated, acutely-pointed callus; on the parietal side of the inner fourth of the last and running round rather obliquely within from two-thirds to three-fourths of the penultimate whirl, thus revolving nearly once round the shell, is a thread-like, elevated, white internal lamina. Greater diam. 14, lesser 12½; height 3½ mill.

Fig. 182.



Helix cereolus, enlarged.

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Helix cereolus, Muhlfeldt, Berlin Mag. VIII (1816), 41, pl. ii, f. 18.—Pfeiffer, Mon. Hel. Viv. I, 408; ? in Chemnitz, ed. 2, I, 378, pl. lxvi, f. 1–3.—? Reeve, Con. Icon. 698.—Bland, Ann. N. Y. Lyc. VII, 136, f. 2.—W. G. Binney, Terr. Moll. IV, 80, part, pl. lxxvii, f. 23.

Helix septemvolva, ? Ferussac, Hist. pl. li, f. 6.—? Wood, Index Test. Suppl. vii, f. 14; ed. Hanley, 226, f. 14.—? Sowerby, Conch. Man. ed. 2, f. 275.—Binney, Bost. Journ. Nat. Hist. III, 391, pl. xix, f. 4 (1840); Terr. Moll. II, 196, pl. xxxviii, central line.—Deshayes in Fer. Hist. 5.

Helix planorbula, Lamarck? An. s. Vert. VI, 89.—? Deshayes in Lam. VIII, 67; Encycl. Méth. II, 208 (1830).—? Delessert, Rec. pl. xxvi, f. 3 (1841).—? Chenu, Illust. Conch. pl. xii, f. 3.

Helix cereolus, var. *laminifera*, W. G. Binney, Proc. Acad. Nat. Sci. Phila. 1858, 200, no descr.

Polygyra cereolus, Tryon, Am. Journ. Conch. III, 158, pl. xi, f. 19–21 (1867).

Indian Key and Indian River, Florida.

The umbilical opening, in specimens of about equal size, is only half the width of that in *septemvolva;* the last whirl is wider, especially towards its termination at the aperture, more inflated, and rather less acutely carinated. The aperture is more orbicular, more contracted, and the peristome more expanded and acutely reflected, and at its junction below with its pillar lip more closely appressed to the last whirl.

Fig. 182 represents a specimen broken, so as to show the internal lamina.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8640	1	Florida.	W. G. Binney.	Cab. series.
8820	100+	Indian Key, Fla.	G. Wurdemann.	.....

Helix carpenteriana, Bland.—Shell umbilicate, orbicular, horn-colored or pale rufous, above flat, obliquely and acutely ribbed, beneath convex, slightly striated, shining, often ornamented with indistinct white spots; suture deeply impressed; whirls five and a half to six and a half, the last subangular at the periphery, shortly but suddenly deflected at the aperture, gibbous, scrobiculate, constricted, tumid behind the aperture, and ribbed, base dilated, with a white internal thread-like lamina[1] on the columellar wall near the point of attachment of the aperture; aperture

[1] As in *H. cereolus*, see Fig. 182, p. 106.

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Fig. 183.

Helix carpenteriana, enlarged.

very oblique, lunate; peristome callous within, thickened, little reflected, the margins joined by a triangular dentiform lamella. Greater diam. 10, lesser 9; height 4 mill.

Helix microdonta, PFEIFFER, Mon. Hel. Viv. 499, ex parte? (1848).—W. G. BINNEY. Terr. Moll. IV, 91, pl. lxxviii, f. 28, excl. fig.

Helix carpenteriana, BLAND, Ann. N. Y. Lyc. VII, 137.

Polygyra carpenteriana, TRYON, Am. Journ. Conch. III, 159, pl. xi, f. 24, not 23 (1867).

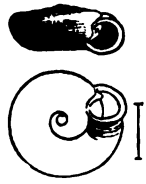
Florida, from St. Augustine through the Keys.

This species has been hitherto named *H. microdonta* in American cabinets. It is readily distinguished from all the other species of the group by its strong acute rib-like striæ, and the peculiarity of the outer whirl. About the last third of it, behind the aperture, is ribbed and tumid; the whirl is then rather abruptly contracted, becoming narrower above, and flattened and slightly striated beneath, but again, as it passes towards and beneath the aperture, dilated and convex. This change of form gives to the last whirl a distorted appearance. The internal lamina is on the columellar wall of the contracted and flattened portion of the last whirl, and runs obliquely, in the direction of the aperture, attaining a length in a large specimen of about 6 mill. The character of the aperture is most like that of *H. cereolus*, but in that species the last whirl has none of the peculiarities above described. The internal lamina is found in a majority of specimens, but not in all; it can generally be seen through the outer wall of the shell.

The upper figure is engraved directly from a photograph on wood.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7038	45	Key Biscayne, Fla.	G. Wurdemann.	.....
8583	9	" "	"	Cab. series.

Fig. 184.



Helix febigeri.

Helix febigeri, BLAND.—Shell umbilicate, orbicular, flat, thin, shining, pale or reddish horn-colored, with rather distant rib-like striæ above, finely striated beneath; spire almost level; suture deep; whirls five and a half to six, rather convex, regularly increasing, the last angular at the periphery, inflated below; umbilicus funnel-shaped; aperture oblique, kidney-shaped; peristome thickened, little reflected, the margins joined by a strong triangular callus. Greater diam. 8½, lesser 7½; height 3½ mill.

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Helix febigeri, Bland, Am. Journ. Conch. II, 373, pl. xxi, f. 10 (1866).
Polygyra febigeri, Tryon, Am. Journ. Conch. III, 160, pl. x, f. 30, 33 (1867).

New Orleans.

This species certainly differs from *H. cereolus*, Muhl., *H. septemvolva*, Say, *H. volvoxis*, Parr., and *H. carpenteriana*, Bld., the four species of the same group hitherto found on the North American continent. Compared with *H. paludosa*, Pfr., of Cuba, the rib-like striæ are more regular and prominent, it is more decidedly angular at the periphery, and the form and armature of the aperture are different. In *H. febigeri* there is no such excavation below the angle of the periphery as prevails, more or less, in the other above-named continental species. In this respect, and in the form of the aperture, *H. febigeri* appears to be most nearly allied to *H. microdonta*, Desh., of Bermuda and New Providence, but it is more coarsely striated, and the last whirl is more inflated below.

Helix pustula, Fer.—Shell umbilicated, orbicularly depressed, minutely striated, reddish or pale horn-color, hirsute; spire scarcely elevated; whirls four and a half, flattened, gradually increasing, the last more convex below, deflected at the aperture, constricted behind the peristome; umbilicus broad, pervious, with a deep groove marked within the shell by an internal, revolving ridge-like lamella, branching from a stout transverse, internal tubercle; aperture very oblique, narrow, sinuously lunate; peristome sinuous, white, thickened, acute, somewhat reflected, its terminations joined by a two-forked, elevated, acutely-pointed lamina, the basal margin with two approximated acute denticles, the columellar termination entering and somewhat covering the umbilicus. Greater diam. 5, lesser 4; height 2½ mill.

Fig. 185.

Helix pustula.

Helix pustula, Ferussac, Hist. pl. 1, f. 1.—Deshayes in Fer. I, 78, t. 1, f. 1.—Pfeiffer, Symb. III, 81; Mon. I, 422; IV, 268, excl. β; in Chemnitz, ed. 2, I, 376, pl. lxv, f. 18–20 (1846).—Reeve, Con. Icon. 721 (1852).—Bland, Ann. N. Y. Lyc. VI, 346, f. 1 (1858).—W. G. Binney, Terr. Moll. IV, 94, pl. lxxvii, f. 12.—Not of Binney.
Dædalochila pustula, Tryon, Am. Journ. Conch. III, 62, pl. x, f. 6, 17 (1867).

South Carolina, Georgia, Florida, Texas.

The groove within the umbilicus is a very marked feature in Ferussac's species, and though not referred to in his description,

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is distinctly shown in one of the figures; it is entirely wanting in *H. leporina*, and also in *H. pustuloides*. This groove is not only an external character, but its presence modifies the internal structure of the shell. On opening the base of the last whirl immediately behind the aperture, a strongly developed transverse tubercle is seen within, from which a strong ridge-like lamella runs round the umbilical opening, corresponding in extent with the groove. This tubercle, and the extension of it, are entirely disconnected by a sinus or channel from the floor of the penult whirl.

The hirsute character of this species is not generally alluded to by authors. The outer edge of the peristome in specimens from St. Augustine, is of a deep rose color.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8642	4	St. Simon's Is., Ga.	Dr. J. Lewis.	Cab. series.

Helix pustuloides, BLAND.—Shell widely umbilicate, planorboid, thin, rufous or pale horn-colored, delicately striated, with thin sparingly hirsute epidermis; spire scarcely elevated; whirls four to four and a half, slightly convex, gradually increasing, the last subangular at the periphery, at the aperture gibbous, constricted, suddenly deflected, beneath devious; suture rather deeply impressed; umbilicus wide, equal to one-third of the larger diameter of the shell, showing all, but especially the penult whirl; aperture with an internal fulcrum-like process on the base of the shell, oblique, crescentic, with an erect, oblique, white, parietal lamelliform tooth, joined to the upper angle of the aperture by a slightly arcuate, filiform callus; peristome reflected, with margins approaching, and having two dentiform lobes separated by a deep fissure. Greater diam. 5½, lesser 4½; height 2½ mill.

Fig. 186.

Helix pustuloides.

Helix pustula, BINNEY, Terr. Moll. II, 201, pl. xxxix, f. 3, not of FERUSSAC.

Helix pustuloides, BLAND, Ann. N. Y. Lyc. VI, 350, f. 3 (1858).—W. G. BINNEY, Terr. Moll. IV, 93.

Dædalochila pustuloides, TRYON, Am. Journ. Conch. III, 61, pl. x, f. 2, 3 (1867).

Georgia and Alabama.

H. pustuloides is intermediate in size between *H. pustula* and *H. leporina*—is less globose than the former, and more sparingly

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hirsute. It differs widely from both in the character of the umbilicus; the aperture is much like that of *pustula*, but more narrow than that of *leporina*. The inferior tooth on the peristome is more developed laterally than in *H. pustula*—indeed it has a somewhat bifid appearance, in which respect it is more allied to *H. leporina*.

The *fulcrum* in *H. pustuloides* is of the same nature as that in *H. leporina*, but less developed, and with the outer edge entire.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7937	4	North Georgia.	A. Gerhardt.	● .....
8589	4	" "	"	Cab. series.

Helix leporina, GOULD.—Shell with a partially covered umbilicus, depressed, orbicular, thin, reddish horn-color, delicately striated, and, when fresh, having a delicate down on its surface; spire depressed, composed of five slightly convex whirls, the last of which is obtusely angular at its upper portion; base convex, excavated at the umbilical region, with a minute, partially covered umbilicus; aperture oblique lunate; peristome incumbent, rose-colored, reflexed, bearing on its dilated basal edge two expanded teeth separated by a deep, narrow fissure, its terminations joined by a quadrate, erect, oblique lamella, whose upper edge is joined to the upper angle of the aperture by a thread-like callus; an internal, fulcrum-like tubercle, with uneven outer edge, on the base of the shell. Greater diam. 6, lesser 5½; height 3 mill.

Fig. 187.

Helix leporina.

Helix leporina, GOULD, Proc. Bost. Soc. III, 39 (1848); in Terr. Moll. II, 199, pl. xl, a, f. 1.—REEVE, Con. Icon. 722 (1852).—BLAND, Ann. N. Y. Lyc. VI, 348 (1858).—W. G. BINNEY, T. M. IV, 92.—PFEIFFER, Mon. Hel. Viv. IV, 320, no descr.

Helix pustula, PFEIFFER, Mon. Hel. Viv. I, 70, descr.: var. β; III, 268, not of FERUSSAC.

Dædalochila leporina, TRYON, Am. Journ. Conch. III, 61, pl. x, f. 1, 4 (1867).

Indiana, Illinois, Arkansas, Mississippi, Georgia.

H. leporina is larger than *H. pustula*, less elevated, the whirls are less convex, the incremental striæ less numerous and distinct, and the aperture is wider. The umbilicus is more nearly covered by the peristome, and is without the groove which prevails in *pustula*. Within and near the aperture, there is what may be called the *fulcrum*, extending from the floor of the last to that of

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the penultimate whirl, and approaching in character to, but less strongly developed, than that in *H. monodon*. The outer edge of this *fulcrum* is uneven—in one specimen somewhat denticulated.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8643	1	Illinois.	R. Kennicott.	Cab. series.

Subgenus **POLYGYRELLA**, Bland.

Shell widely umbilicated, discoidal, ribbed above, smoother below; whirls 7–8, gradually increasing, the last deflected above, furnished within with two rows of three teeth; base flattened, umbilicus of equal size to the apex; aperture subvertical, oblique, lunate-oval; peristome white, simple, much thickened within, margins joined by a white, pliciform, elevated, triangular tooth.

Helix polygyrella, Bland.—Shell widely umbilicate, discoidal, flat, shining, translucent, yellowish horn-colored, ribbed above, the ribs obsolete near the aperture, base rather smooth; spire scarcely elevated; whirls seven to eight, somewhat convex, gradually increasing, the last slightly deflexed above, armed within with two rows of three teeth, seen through the outer wall; umbilicus pervious, of equal size to the apex; aperture subvertical, oblique, lunate-oval; peristome depressed above, white, simple, much thickened within, the margins joined by a white, pliciform elevated, triangular tooth. Greater diam. 11½, lesser 10½; height 5 mill.

Fig. 188.

Helix polygyrella.

Helix polygyrella, Bland & Cooper, Ann. N. Y. Lyc. VII, 365, pl. iv, f. 13–15 (1861).

Polygyra polygyrella, Tryon, Am. Journ. Conch. III, 160, pl. xi, f. 26 (1867).

Common on the Cœur d'Alêne Mountains, especially on their eastern slope, in spruce forests.

Subgenus **STENOTREMA**, Raf.

Shell with the perforation covered, lenticular or globosely depressed, hairy; whirls 4½–6, the last anteriorly gibbous,

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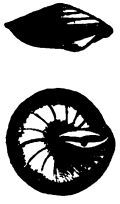
shortly deflexed, tumid below; spire somewhat elevated; peristome with a white, thickened margin, briefly reflexed above, somewhat constricted in its basal portion, usually sinuous and dentate, furnished with an internal transverse tubercle on the floor of the base of the last whirl.

Helix spinosa, LEA.—Shell imperforate, lenticular, with the upper surface much flattened, acutely carinated; epidermis dark chestnut color, with minute, hair-like processes lying flat upon the whirls in the direction of their lines of growth, striate; whirls six, of nearly uniform width, and decreasing very gradually from the aperture to the spire; suture distinct, slightly raised; aperture very narrow; peristome yellowish-white, near its junction with the body-whirl thickened, angulated, and slightly reflected, with a median cleft; parietal wall with a long, yellowish, narrow, projecting tooth, extending from the umbilical axis to the angle of the peristome, and parallel with its thickened edge; base convex, with the umbilical region slightly indented; within the shell, springing from the axis, is a transverse, curved, white tubercle. Greatest diam. 14, lesser 13; height 6 mill.

Fig. 189.



Helix spinosa.

Carocolla spinosa, LEA, Am. Phil. Trans. IV, 104, pl. xv, f. 35; Obs. I, 114 (1834).

Helix spinosa, BINNEY, Bost. Journ. Nat. Hist. III, 367, pl. xi, f. 2 (1840); Terr. Moll. II, 153, pl. xliv, f. 1, excl. syn.—PFEIFFER, Mon. Hel. Viv. I, 421; in CHEMNITZ, ed. 2, I, 375, pl. lxv, f. 15–17 (1849).—DEKAY, N. Y. Moll. 47, pl. v, f. 114 (1843).—REEVE, Con. Icon. 685 (1852).—W. G. BINNEY, Terr. Moll. IV, 65.

Fig. 190.

Helix spinosa.

Stenotrema spinosa, TRYON, Am. Journ. Conch. III, 58, pl. ix, f. 26, 28, 29 (1867).

Alabama, Georgia, Tennessee.

Fig. 190 shows the internal tubercle.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8635 8996	3	Alabama. Eutaw, Ala.	W. G. Binney.	Cab. series. .....

Helix labrosa, BLAND.—Shell imperforate, lenticular, carinated, the carina somewhat obsolete behind the aperture, solid, with curved striæ, dark-brown colored beneath the epidermis, epidermis thin, with prostrate hairs; spire convex-conoid, obtuse; whirls five and a half, rather

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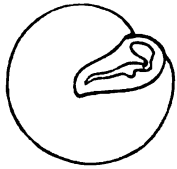
convex, the last deflexed, constricted, the base inflated, and sculptured beneath the epidermis with numerous impressed spiral lines; the aperture very oblique, narrowly ear-shaped, contracted by a strong linguiform tooth extending along the entire parietal wall; peristome callous, somewhat reflected, the margin joined by a sinuous callus, the basal margin thickened, inwardly much dilated, with a deep and wide notch in the middle; with an internal transverse tubercle on the base of the shell. Greater diam. 12½, lesser 10; height 6½ mill.

Fig. 191.



Helix labrosa, enlarged.

Helix labrosa, BLAND, Ann. N. Y. Lyc. VII, 430, pl. iv, f. 19 (1861).

Stenotrema labrosa, TRYON, Am. Journ. Conch. III, 59, pl. ix, f. 25 (1867).

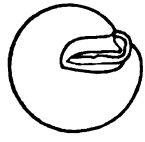
Arkansas, Alabama, Tennessee.

The thickened and reflected peristome, and deep wide notch, sufficiently distinguish *H. labrosa* from *H. edgariana*. The notch in the latter, situated in the centre of the aperture as in *H. stenotrema*, is in a measure obsolete, but in *H. labrosa* it is strongly developed, and nearer to the outer edge of the peristome, as in *H. hirsuta*. The form of the parietal tooth of this species is like that of *H. hirsuta*, while *H. edgariana* is in that particular more like *H. stenotrema*. *H. edgariana*, in fact, connects *H. stenotrema* with *H. spinosa*, but *H. labrosa* is rather allied to *H. hirsuta*, and in the character of the peristome to *H. maxillata*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8961		Hot Springs, Ark.	Dr. B. Powell.	Teste Bland.

Helix edgariana, LEA.—Shell imperforate, lenticular, carinated, solid, arcuately striate, under the epidermis yellowish flesh-color, with distant, short, prostrate hairs; spire convex conoid, rather obtuse; whirls five, flattened, the last anteriorly deflected, subconstricted; aperture very oblique, most narrowly ear-shaped, narrowed by a stout, tongue-shaped, arcuately entering tooth on the full length of the parietal wall; peristome subcontinuous, its upper margin subsimple, its basal margin much dilated inwardly, with a slight median cleft; far within on the base of the shell is a stout, transverse tubercle. Greater diam. 9, lesser 8; height 5 mill.

Fig. 192.



Helix edgariana, enlarged.

Caracolla edgariana, LEA, Trans. Am. Phil. Soc. IX, 2; Obs. IV, 2 (1843); Proc. II, 31 (1841); in TROSCHEL'S Arch. f. Nat. 1843, II, 124.

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Helix edgariana, PFEIFFER, Mon. Hel. Viv. I, 425.—BINNEY, Terr. Moll. II, 155, pl. xliv, f. 2.—REEVE, Con. Icon. 703.—W. G. BINNEY, Terr. Moll. IV, 65.—BLAND, Ann. N. Y. Lyc. VII, 428, pl. iv, f. 18.

Stenotrema edgariana, TRYON, Am. Journ. Conch. III, 59, pl. ix, f. 27 (1867).

Tennessee, Alabama, Arkansas.

H. edgariana differs from *H. spinosa* in the following particulars: it is smaller, more elevated, and more convex beneath. In form the parietal tooth is most like that of *H. stenotrema*, while that of *H. spinosa* is more nearly allied to that usually prevailing in *H. hirsuta*. The whirls of *H. spinosa* are flattened and exserted, the carinated edges of all being seen, but in *H. edgariana* the upper whirls are rather convex, and defined by a well-marked suture. Traces of hairs rarely exist at the base of *H. spinosa*, and no scars indicating their presence are visible on dead or denuded shells, whereas in *H. edgariana* there are distant, short, prostrate hairs, with strongly marked scars on the shell. Fresh or young specimens have no doubt the cilia, as in *H. spinosa*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8634	1	.....	W. G. Binney.	Cab. series.

Helix edvardsi, BLAND.—Shell imperforate, lenticular, carinate, the carina obsolete near the aperture, rather thin, beneath the epidermis pale brown; the epidermis dark chestnut-color, with numerous minute curved hair-like processes lying flat upon, and attached to the epidermidal surface of the upper whirls in the direction of the incremental striæ, the epidermis at the base covered with acute, raised, transverse tubercles, most numerous, and having erect bristles near the aperture; spire convex-conoid; whirls five, flattened, gradually increasing, the last gibbous above, suddenly but slightly deflected; apex minutely granulate; base convex, little indented in the umbilical region, and with impressed spiral lines beneath the epidermis; suture deeply impressed; aperture oblique, transverse, auriform, narrowed by a slender slightly arcuate, lamelliform parietal tooth extending across from the umbilical axis, and terminating with a short angular deflection within the aperture; upper margin of the peristome acute, scarcely reflected, and partially appressed to the body-whirl, with a tooth-like callus within, having an almost obsolete notch in the centre; with an internal transverse tubercle on the base of shell. Greater diam. 9, lesser 8; height 5 mill.

Fig. 193.

Helix edvardsi.

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Helix edvardsi, BLAND, Ann. N. Y. Lyc. VI, 277, pl. ix, f. 14–16 (1858). —W. G. BINNEY, Terr. Moll. IV, 63, pl. lxxix, f. 7–9.—PFEIFFER, Mal. Blatt. 1859, 13.

Stenotrema edwardsi, TRYON, Am. Journ. Conch. III, 59, pl. ix, f. 34 (1867).

Mountains of Fayette or Green Briar Co., Virginia.

This species is allied to or rather intermediate between *H. barbigera* and *H. hirsuta*, Say—the former connecting *H. spinosa* with *H. fraterna*. It is smaller, more elevated, less acutely carinated, and readily distinguished from *H. barbigera* by the partially appressed, notched peristome, and the different character of the epidermis. In *H. barbigera* the attached hair-like epidermidal processes are produced, at the sutures and carina, into cilia which are entirely wanting in this species. The same processes, though less numerous, and sometimes almost obsolete, are observable at the base of the former, while in the latter, the basal epidermis approaches in character to that of *H. palliata*. The deep characteristic notch in *H. hirsuta* is considerably less developed in *H. edvardsi*, and the callus which connects the parietal tooth with the upper margin of the peristome in the former, does not exist in the latter. In the general character of the peristome the species under consideration resembles *H. hirsuta*, while *H. barbigera* is in that particular more appropriately compared with *H. fraterna*, Say.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8827	1	Kenawha, Va.	T. Bland.	.....

Helix barbigera, REDFIELD.—Shell imperforate, sharply carinate, rather thin, dark horn-colored or brown; the upper surface has the epidermis raised into acute striæ, which at the suture and carina are produced into short cilia or bristles; these epidermidal striæ are sometimes seen beneath, but less distinctly, being often obsolete in the mature shell; basal surface convex, but indented in the umbilical region; spire slightly convex; whirls five and a half, rather flat, last one suddenly but slightly deflected; aperture very oblique, transverse, ear-shaped, narrowed by a rather slender, tongue-shaped tooth, which extends nearly across the whole width of the aperture; peristome callous, margins slightly but distinctly reflected, and thickened within, basal margin

Fig. 194.

Helix barbigera, enlarged.[1]

[1] The figure was photographed on wood.

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slightly arcuate, but entire; with an internal transverse tubercle at the base of the shell. Greater diam. 10, lesser 9; height 6 mill.

Helix barbigera, REDFIELD, Ann. N. Y. Lyc. VI, 171, pl. ix, f. 4, 5, 7 (1856).—GOULD in Terr. Moll. III, 21.—W. G. BINNEY, Terr. Moll. IV, 63, pl. lxxvii, f. 2.—PFEIFFER, Mon. Hel. Viv. IV, 348.

Stenotrema barbigera, TRYON, Am. Journ. Conch. III, 60, pl. ix, f. 22, 23 (1867).

Tennessee, Georgia, and Alabama.

Smaller and more delicate than *H. spinosa;* striæ more numerous, thickly set with fine ciliæ, which project at the periphery in a fine fringe, and not like short triangular aculei, as in *spinosa.* The umbilical region is less depressed, the parietal tooth much more delicate, and does not overlap the peristome which stands off from the shell, and is not appressed to it. *H. edgariana* is much more solid and elevated, has the parietal tooth more developed, the peristome notched, as in *H. hirsuta*, but has about the same diameter.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8828	2	Cherokee County, N. C.	T. Bland.	.....

Helix stenotrema, FER.—Shell imperforate, globose, diaphanous, reddish, hirsute, convex above, inflated below; spire elevated; whirls five, somewhat convex, the last anteriorly gibbous, angularly deflected; aperture irregularly transversely lunar, almost linear, contracted by a long, stout, elevated, lamelliform tooth along the whole length of the parietal wall, furnished far within on the base of the last whirl with a transverse tubercle, springing from the axis; peristome scarcely expanded above, thickened by a heavy, regularly curving callus, its basal margin with a small notch. Greater diam. 10, lesser 9; height 6 mill.

Fig. 195.

Helix stenotrema.

Helix stenotrema, FERUSSAC in Mus. teste PFEIFFER, Symb. II, 39, excl. *pustula.*—REEVE, Con. Icon. 702.—W. G. BINNEY, Terr. Moll. IV, 61.—BLAND, Ann. N. Y. Lyc. VII, 327.

Helix hirsuta, var. *a*, FERUSSAC, Hist. pl. 1, A, f. 3.—*β*, PFEIFFER, Mon. Hel. Viv. I, 421; in CHEMNITZ, ed. 2, I, 376 (1846), pl. lxv, f. 12–14 (1849), var. *stenotrema.*—Var. BINNEY, Terr. Moll. II, 151, pl, xlii, f. 4.—DESHAYES in FER. I, 140.

Stenotrema convexa, RAFINESQUE, Enum. and Acc. 3 (1831); BINNEY and TRYON ed., 28.

Stenotrema stenotrema, TRYON, Am. Journ. Conch. III, 56, pl. ix, f. 21, 30 (1867).

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It is not found in the Eastern or Middle States, but from North Carolina and Kentucky it extends through all the Southern States. Also in Indiana, and in the postpleiocene of the Mississippi Valley.

In *H. stenotrema* the notch is invariably small, and more central than in *H. hirsuta;* the parietal tooth is more produced over the aperture, and its lower edge is a regular curve, not somewhat sinuous as in the latter and *H. spinosa;* it is also curved downwards at its outer extremity, not terminating abruptly, as usual in those species. The form of the parietal tooth, however, varies in *H. hirsuta*, from which this species can chiefly, if indeed not alone, be distinguished by the size and position of the notch.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7999	11	Alabama.	.....	.....
8609	2	.....	W. G. Binney.	Cab. series.
8963		Hot Springs, Ark.	Dr. B. Powell.	.....

Helix hirsuta, Say.—Shell imperforate, subglobose; epidermis brownish, or chestnut, covered with numerous, sharp, rigid hairs; whirls five, rounded; suture distinct; aperture contracted, very narrow, almost closed by an elongated, lamelliform tooth, situated on the parietal wall, and extending from the centre of the base, within the junction of the peristome with the outer whirl, into the edge of the aperture; peristome narrow, very much depressed, and reflected against the outer whirl, with a deep cleft or fissure near the centre of the basal margin; umbilicus wholly covered; base convex; far within the base of the shell is a transverse tubercle starting from the axis. Greater diam. 7½, lesser 7; height 4¾ mill.

Fig. 196.

Helix hirsuta.

Helix hirsuta, Say, Journ. Phila. Acad. I, 17 (1817); II, 161; ed. Binney, 8.—Binney, Bost. Journ. Nat. Hist. III, 365, pl. x, f. 3 (1840); Terr. Moll. II, 150, pl. xlii, f. 3, excl. *stenotrema*.—DeKay, N. Y. Moll. 36, pl. iii, f. 27.—Gould, Invertebrata, 175, f. 116 (1841).—Férussac, Tab. Syst. 38; Hist. pl. 1, a, f. 1.—Deshayes in Lam. VIII, 113; ed. III, 308; Encycl. Méth. II, 253 (1830); in Fér. I, 140.—Mrs. Gray, Fig. of Moll. An. pl. cxciii, f. 8, ex Bost. Journ.—Pfeiffer, Mon. Hel. Viv. excl. var. β, I, 421; in Chemnitz, ed. 2, excl. var. I, 374 (1846), pl. lxv, f. 9–11 (1849).—Reeve, Con. Icon. no. 714 (1852).—Leidy, T. M. U. S. I, 257, pl. xi, f. 5, 6 (1851), anat.—W. G. Binney, Terr. Moll. IV, 62.—Bland, Ann. N. Y. Lyc. VII, 327.—Morse, Amer. Nat. I, 151, f. 14, 15 (1867).

Helix sinuata, γ, Gmelin (teste Pfeiffer).

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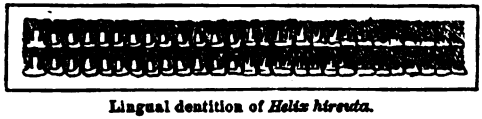
Helix isognomostomos, γ, GMELIN (teste PFEIFFER).
Tridopsis hirsuta, WOODWARD, Man. pl. xii, f. 7, no desc.
Helix fraterna, WOOD, Index Suppl. 21, pl. viii, f. 16 (1828); ed. HANLEY, 226, f. 16.
? *Helix porcina*, SAY, Long's Exped. (1824), II, 257, pl. xv, f. 2 (young); BINNEY's ed. 30, pl. lxxiv, f. 2.—DEKAY, N. Y. Moll. 45 (1843).—PFEIFFER, Mon. Hel. Viv. III, 97.—BLAND, Ann. N. Y. Lyc. VI, 344, with fig. (1858).
Stenotrema hirsuta, TRYON, Am. Journ. Conch. III, 57, pl. ix, f. 24 (1867).

From New England to Kansas and Virginia. Also in the post-pleiocene beds of the Mississippi Valley.

The last whirl in front of the aperture, especially in the larger forms, is more or less angulated, but never carinated. The position of the parietal tooth is often rather oblique, but usually nearly parallel with the peristome, and is more or less distant from it. The nature of the epidermis varies; in some forms the hairs are very numerous, in others comparatively few. Spiral impressed lines sometimes occur beneath the epidermis, at the base of the shell.

The central teeth of the lingual membrane are tricuspid, the

Fig. 197.



Lingual dentition of *Helix hirsuta*.

side cusps very small; the laterals of same shape, but bicuspid; uncini irregularly toothed.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7992	6	Columbus, O.	Dr. J. Lewis.	.....
7995	8	Alabama.	.....	.....
7996	3	Milwaukee, Wis.	I. A. Lapham.	.....
7997	8	District of Columbia.	W. Stimpson.	.....
7998	4	Marietta, Ohio.	W. Holden.	.....
8624	8	Ohio.	W. G. Binney.	Cab. series.
8748	5	.....	.....	.....
8760	2	Ohio.	W. Stimpson.	.....
8770	9	Massachusetts.	"	.....

Helix maxillata, GOULD.—Shell imperforate, globose-conic, rather solid, completely covered with short hairs, chestnut-colored; spire convex-conoid, apex obtuse; whirls five, rather convex, gradually increasing, the last anteriorly deflected, constricted, subinflated below; aperture oblique,

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linear, almost closed by a broad, jaw-shaped denticle within the peristome; peristome thickened, its terminations joined by a stout, erect parietal callus, the right margin subrectilinear, arched, angularly merging into the very heavy basal margin; within the base of the shell is a transverse tubercle. Greater diam. 7, lesser 6; height 5 mill.

Fig. 198.

Helix maxillata.

Helix maxillata, GOULD, Proc. Bost. Soc. III, 38; in Terr. Moll. II, 157, pl. xl, a, f. 2.—PFEIFFER, Mon. Hel. Viv. III, 126; IV, 164.—W. G. BINNEY, Terr. Moll. IV, 65.

Stenotrema maxillata, TRYON, Am. Journ. Conch. III, 57, pl. ix, f. 31, 35 (1867).

Tennessee, Alabama, Georgia.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8039	3	Columbus, Ga.	Dr. J. Lewis.	.....
8632	5	"	"	Cab. series.

Helix germana, GOULD.—Shell imperforate, solid, depressed, low-conical above, convex beneath, slightly angular at periphery, covered with a scabrous, rusty horn-colored epidermis, beset with scattered hairs; whirls five and a half, closely revolving, separated by a well impressed suture; aperture lunate, the basal portion being but slightly curved, and turning upward at a rather sharp angle; peristome incumbent, with a deep stricture behind it, moderately reflexed, roseate; on the parietal wall of the aperture is a distinct, oblong, erect, white tooth, not connected with either extremity of the peristome. Greater diam. 7½, height 5 mill.

Fig. 199.

Helix germana.

Helix germana, GOULD, U. S. Expl. Exped. Moll. (1852), 70, f. 40, a, b, c; Terr. Moll. II, 156, pl. xl, a, f. 3.—PFEIFFER, Mon. Hel. Viv. III, 269.—W. G. BINNEY, Terr. Moll. U. S. IV, 11.

Stenotrema germana, TRYON, Am. Journ. Conch. III, 58, pl. ix, f. 22, 23 (1867).

Oregon.

Helix monodon, RACKETT.—Shell imperforate or umbilicated, globose-depressed, diaphanous, reddish horn-colored, covered with short hairs; spire rather convex; whirls five and a half, the upper ones flattened, the two last convex, the last anteriorly gibbous, constricted at the aperture; umbilicus more or less opened, or completely closed;

Fig. 200. Fig. 201. Fig. 202.

Var. *lentil.*[1] *Helix monodon.* Var. *fraterna.*

[1] The specimen figured is abnormal in not having a parietal tooth.

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aperture widely lunar, somewhat narrowed by a lamelliform tooth on the parietal wall; peristome acute, reflected, thickened with white callus within; a transverse internal tubercle on the base of the shell. Greater diam. 11, lesser 10; height 6 mill.

Helix monodon, RACKETT, Linn. Trans. XIII, 42, pl. v, f. 2 (1822); ed. CHENU, 269, pl. xxvii, f. 5.—WOOD, Ind. Supplem. pl. vii, f. 15 (1828); ed. HANLEY, 226, f. 15.—BINNEY, Bost. Journ. Nat. Hist. III, 360, pl. x, f. 1 (1840); Terr. Moll. II, 147, pl. xli, lower figs.—GOULD, Invertebrata, 174, f. 113 (1841).—ADAMS, Vermont Mollusca, 159 (1842).—W. G. BINNEY, Terr. Moll. IV, 60.—DEKAY, N. Y. Moll. 35, part, excl. syn., pl. iii, f. 19, not f. 21, a, b (1843).—MRS. GRAY, Fig. Moll. An. pl. cxciii, f. 11 (ex Bost. Journ., no desc.).—BILLINGS, Canadian Nat. II, 100, f. 6 (1857).—MORSE, Amer. Nat. I, 151, f. 12, 13 (1867).—PFEIFFER. Mon. Helic. Viv. IV, 320.

Helix convexa, CHEMNITZ, part (excl. syn. et tab. lxvi, f. 24, 27), pl. x, 17, 18.—PFEIFFER, Mon. Hel. Viv. III, 268 (excl. β et γ).—DESHAYES in LAM. VIII, 112; 3d ed. III, 308; Encycl. Méth. II, 253 (1830); in FER. *l. c.* I, 144.—REEVE, Con. Icon. 696 (1852), excl. syn.; no. 717 (1854).

Helicodonta hirsuta, α, FERUSSAC, Tabl. Syst. 101, no desc.

Stenotrema monodon, MORSE, Journ. Portl. Soc. I, 10, f. 13, pl. ii, f. 2; pl. iv, f. 14 (1864).—TRYON, Am. Journ. Conch. III, 56, pl. ix, f. 18, 20 (1867).

VAR. FRATERNA.

Helix fraterna, SAY, Long's Exp. II, 257, pl. xv, f. 3; BINNEY's ed. 30, pl. lxxiv, f. 3.—MRS. GRAY, Fig. Moll. An. pl. cxciii, f. 5, no descr.—BINNEY, Bost. Journ. Nat. Hist. III, 363, pl. x, f. 2, not of WOOD.

Helix monodon, DEKAY, N. Y. Moll. *l. c.* ex parte, pl. iii, f. 21, a, b (1843).—WOOD, Ind. Suppl. pl. vii, f. 15.

Helix convexa, CHEMNITZ, ed. 2, I, 86, ex parte.—Var., REEVE, Con. Icon. *l. c.*—β, PFEIFFER, Mon. Hel. Viv. I, 420.

Helix monodon, β, PFEIFFER, *l. c.* IV, 320.

VAR. LEAII.

Helix convexa, γ, PFEIFFER, *l. c.*—Var. CHEMNITZ, *l. c.* pl. lxvi, f. 24, 25.

Helix monodon, γ, PFEIFFER, IV, 320.—Part BINNEY, Terr. Moll. pl. xli, central figures.

Helix leaii, WARD, MS. teste BINNEY.

—— LISTER, Syn. Conch. pl. xciii, f. 94.

All of eastern North America, through Canada. Also in the postpleiocene of the Mississippi Valley.

The varieties of this shell present remarkable differences in size and coloring, and in the form of the umbilicus. The transverse diameter varies from one-sixth to three-sixths of an inch, and the form from subglobular in small specimens to a very flattened

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shape in the larger. The coloring exhibits every shade, from light amber to dark chestnut. The whirls of some revolve about the axis at such a distance as to leave a deep and wide umbilicus (*monodon*); while in others they are in such near approximation as to permit only a small perforation, which the narrow, reflected peristome is sufficiently wide to cover (*fraterna*). The hairy projections of the epidermis are most distinct upon the young shells, but are often wanting at every stage of growth. The oblique striæ are so fine as hardly to be visible; and in some instances the shell appears to be glabrous. Very beautiful specimens, about one-fourth of an inch in diameter, with a dark, shining epidermis and open umbilicus, occur in Ohio, Indiana, Iowa, and Michigan. They are more convex, and, as the same number of volutions is contained in half the space, they *appear* to have more whirls than the common variety. Some persons have considered these to form a distinct species (*H. leaii*, Ward, MSS.); but I do not see that they can, with propriety, be separated.

Fig. 203.

Helix monodon.

Fig. 203 is drawn from a curious pathological specimen. The peristome having been broken after the animal's arrival at maturity, a new peristome has been formed somewhat in the rear of the first, and a new parietal tooth added. The base of the shell was purposely broken to show the position of the internal tubercle.

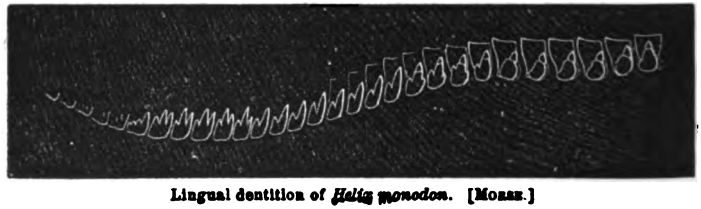
Fig. 204.

Jaw of *Helix monodon.* [Mosss.]

The jaw of *H. monodon* is slightly arcuate, stout, bluntly rounded at ends; anterior surface with broad, stout ribs denticulating each margin.

Lingual membrane with 100 rows of 28—1—28 teeth each; centrals and laterals stout, with a short, pointed apex; uncini irregularly furnished with long denticles.

Fig. 205.



Lingual dentition of *Helix monodon.* [Mosss.]

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Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7987	5	Big Sioux.	.....	.....
7988	1	Alabama.	.....	.....
8607	3	.....	W. G. Binney.	Cab. series.
8790	4	Massachusetts.	W. Stimpson.	.....

VAR. FRATERNA.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7989	10	Columbus, Ohio.	Dr. J. Lewis.	.....
7990	8	Hiram, Ohio.	S. M. Luther?	.....
8032	1	Milwaukee, Wis.	I. A. Lapham.	.....
8625	4	.....	W. G. Binney.	Cab. series.
8811	12	Texas.	.....	.....

VAR. LEAII.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7991	9	Milwaukee, Wis.	I. A. Lapham.	.....
7993	5	Columbus, Ohio.	Dr. J. Lewis.	.....
8606	4	.....	W. G. Binney.	Cab. series.
8789	2	Ohio.	.....	.....

Subgenus TRIODOPSIS, Raf.

Shell imperforate or umbilicated, orbicularly depressed or subglobose; more or less obliquely striated; whirls 5–7, the last somewhat deflexed in front; aperture sinuously-coarctate, subtriangular; peristome white, thickened, broadly and angularly reflexed, usually dentate; parietal wall of the aperture with a strong, obliquely entering denticle.

Fig. 206.

Animal of *Helix palliata*.

Animal (of *H. palliata*) long, narrow, with long and slender eye-peduncles; foot narrow behind, terminating in an acute point.

Helix palliata, Say.—Shell with the umbilicus closed, thin, depressed; epidermis dark brown or chestnut-color and rough with minute, acute projections and stiff hairs; whirls five, flattened above and rounded below, with numerous very fine, oblique striæ; aperture three-lobed, much contracted by the peristome and teeth; peristome white, sometimes edged

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with brown, widely reflected, with two projecting teeth on the inner margin, the one near its junction with the body-whirl acute and prominent, the other, on the basal portion, long, lamellar, and but little prominent; parietal wall with a very prominent, white, curved tooth, projecting nearly perpendicularly from the shell, and forming one boundary of the aperture; umbilicus covered with a white callus, the continuation of the reflected peristome; base convex. Greater diam. 21, lesser 18; height 10 mill.

Fig. 207.

Helix palliata.

Helix palliata, Say, Journ. Phila. Acad. II, 152 (1821); Binney's ed. 10.—Binney, Bost. Journ. Nat. Hist. III, 353, pl. vii (1840); Terr. Moll. II, 136, part, pl. xiv.—Adams, Vermont Mollusca, 159 (1842).—Leidy, T. M. U. S. I, 253, pl. vii, f. 8 (1851), anat.—DeKay, N. Y. Moll. 33, pl. iii, f. 36 (excl. a, b), (1843), excl. syn. pars.—Pfeiffer, Mon. Hel. Viv. I, 316; in Chemnitz, ed. 2, I, 359, pl. lxii, f. 15, 16 (1849).—Mrs. Gray, Fig. Moll. An. pl. cxciii, f. 8, ex Bost. Journ. (no descr.).—Deshayes in Fer. I, 144 (excl. var.).—Reeve, Con. Icon. no. 678.—W. G. Binney, Ter. Moll. IV, 56.—Bland, Ann. N. Y. Lyc. VII, 441.—Morse, Amer. Nat. I, 150, f. 10, 11 (1867).

Helix denotata, Ferussac, Tab. Syst. 38 (1822), no descr.; Hist. pl. xl, a, f. 5; pl. l, a, f. 7.—Deshayes in Lam. VIII, 115; ed. 3, III, 309.

Helix notata, Deshayes, Encycl. Méth. II, 224 (1830).

Xolotrema palliata, Tryon, Am. Journ. Conch. III, 49, pl. ix, f. 4 (1867).

From Canada to Georgia through eastern North America. Also in the postpleiocene of the Mississippi Valley.

Animal of a uniform, blackish, slate-color over the whole upper surface; foot narrow, in length double the diameter of the shell, and terminating in an acute point; eye-peduncles one-third of an inch long; eyes not distinguishable from the general color (see p. 123).

The nature of the epidermis and sculpturing are the only constant specific characters which distinguish *H. palliata* from *H. obstricta*. In the former the epidermis has "numerous minute tuberculous acute prominences;" the striæ are close together, and somewhat irregular in development. In the typical form the whirls are convex, with a well impressed suture; the last whirl is obtusely angulated in front of, but not behind the aperture.

The species varies in the form of the whirls and extent of the angulation of the periphery, as follows:—

Var. β.—Whirls flattened above, slightly exserted, the last more sharply angulated in front of the aperture, with the striæ,

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especially behind the aperture, more distinctly defined. Greater diam. 22, lesser 19½; height 8½ mill. (5 whirls). Kentucky and Tennessee.

Var. γ.—Whirls planulate above, and so exserted as to show the carinated edges of all excepting the apicial whirls, the last whirl with an acute projecting carina continued to the back of the aperture; the umbilicus not always entirely covered by the reflected lip. Greater diam. 21½, lesser 18½; height 7 mill. (5 whirls). Tennessee.

Fig. 208.

Helix palliata.

A curious form of the species is figured here, in which the peristome is carried around the umbilicus, instead of over it.

The lingual membrane has 115 rows of 34—1—34 rows each; central teeth long, conical, with a pointed apex; laterals bicuspid, the inner cusp of same shape as the central teeth; uncini stout, irregularly denticulated.

Fig. 209.

Lingual dentition of *Helix palliata.*

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7934	7	W. States.	W. Stimpson.	.....
8391	4	.....	W. G. Binney.	Cab. series.
8637	2	Columbus, Ga.	Dr. J. Lewis.	"

Helix obstricta, Say.—Shell with the umbilicus closed, depressed, with heavy, rib-like striæ, and interstitial, minute, revolving lines, reddish horn-color; spire flattened; whirls five, depressed, the last convex below, with a prominent, acute carina above; aperture oblique, subtriangular, narrowed by a tongue-shaped, arcuately-entering tooth on the parietal wall; peristome thin, broadly expanded, its inner edge with a heavy thickening of white callus, its right portion with a stout erect denticle, its basal portion straight, dilated, reflected, with a long, lamellar, less prominent denticle. Greater diam. 26, lesser 22; height 11 mill.

Fig. 210.

Helix obstricta.

Helix obstricta, Say, Journ. Phila. Acad. II, 154 (1821); Binney's ed. 17. —Pfeiffer, Mon Hel. Viv. I, 317.—Reeve, Con. Icon. no. 683 (1852). —W. G. Binney, Terr. Moll. IV, 57.—Bland, Ann. N. Y. Lyc. VII, 446.

Helix palliata, var. a, Say, Journ. Phila. Acad. II, 152; Binney's ed. 16.

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—Var. a, b, DEKAY, N. Y. Moll. 33, pl. ii, f. 16 (1843).—Var. BINNEY, Terr. Moll. II, 137, pl. xv.

Helix appressa, var., DESHAYES in FER. (in plate, not in text).

Helicodonta denotata, var., FERUSSAC, Tab. Syst. 38; Hist. pl. 1, A, f. 7, no descr.

Caracolla helicoides, LEA, Trans. Am. Phil. Soc. IV, 103, pl. xv, f. 34; Obs. I, 113 (1834).

Helix caroliniensis, LEA, Trans. Am. Phil. Soc. IV, 108, pl. xv, f. 33; Obs. I, 112 (1834).

Xolotrema obstricta, TRYON, Am. Journ. Conch. III, 49, pl. ix, f. 3 (1867).

Ohio, Indiana, Tennessee, Georgia, South Carolina.

H. obstricta differs from *H. palliata* in the following particulars: The epidermis is free from "tuberculous prominences," but has raised spiral lines between the costæ on the upper and lower surfaces of the shell. It has elevated, rigid, distant costæ, the whirls are subexserted and acutely carinated, the carina of the upper whirls compressed, and overlapping the sutures as in *H. cumberlandiana*. The umbilicus, as in the most carinated form of *H. palliata*, is not always entirely covered by the reflected peristome.

Var. β.—Whirls subexserted, carina less acute and prominent, partially obsolete behind the aperture, not covering the sutures. Greater diam. 24, lesser 19; height 8 mill. (5 whirls). Columbus, Ga. This variety connects *H. carolinensis* with *H. obstricta*, and is generally found in cabinets under the former name.

Var. γ.—Whirls more convex, the last obtusely angulated in front of, but very little behind the aperture. Greater diam. 21, lesser 17; height 7½ mill. (5 whirls). South Carolina. This is the typical *H. carolinensis*, holding precisely the same relation to *H. obstricta*, as *H. palliata* to *H. palliata* var. γ.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8774	1	.....	.....	Cab. series.
8836	2	.....	Lieut. Kurtz.	.....
9192	2	Tenn.	.....	.....

Helix appressa, SAY.—Shell with the umbilicus covered, orbicularly depressed, pellucid, with rib-like striæ and minute revolving lines, reddish horn-colored; spire flattened; whirls five, flattened above, the last obtusely angular (the angle obsolete anteriorly); aperture oblique, compressed, subtriangular; peristome angularly broadly reflected, thickened within, its terminations joined by a thin callus, on which is an obliquely

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entering, erect, curved, tongue-shaped tooth, the basal margin with a lamellar-like, long denticle, the right margin sometimes with an erect tooth-like callus. Greater diam. 18, lesser 15; height 8 mill.

Fig. 211.

Helix appressa.

Helix appressa, Say, Journ. Phila. Acad. II, 151 (1821); ed. Binney, 15.—Binney, Bost. Journ. Nat. Hist. III, 356, pl. viii (1840); Terr. Moll. II, 140, pl. xiii.—DeKay, N. Y. Moll. 27, pl. ii, f. 11 (1843).—Pfeiffer, Mon. Hel. Viv. I, 317; in Chemnitz, Conch. 2d ed. I, 361, t. lxiii, f. 17, 18.—Reeve, Con. Icon. no. 689.—Deshayes in Fer. Hist. I, 141.—W. G. Binney, Terr. Moll. IV, 59.—Bland, Ann. N. Y. Lyc. VII, 432.

Helix linguifera, Lamarck, An. s. Vert. VI, 90 (1822).—Ferussac, Prodr. 95; Hist. pl. xlix, a, f. 3.—Deshayes, Encycl. Méth. II, 224 (1830); in Lam. VIII, 70; ed. 3, III, 293.—Pfeiffer, Symb. ad Hist. Hel. 19 (no descr.).—Chenu, Ill. Conch. pl. xii, f. 5; pl. vii, f. 6.—Delessert, Recueil, pl. xxvi, f. 5 (1841).

Xolotrema appressa, Tryon, Am. Journ. Conch. III, 50, pl. ix, f. 7, 11 (1867).

In Pennsylvania and New York it is not found east of the Appalachian chain. From thence it ranges to Arkansas; and from Georgia to Illinois.

Fig. 212.

Helix appressa.

Fig. 213.

Helix appressa, var. a.

Fig. 212 represents a smaller, more angular form. Fig. 213 represents the var. a of Say, which has two well developed teeth on the peristome. I have received it from Virginia, Tennessee, Kentucky, Ohio, Indiana, and Illinois.

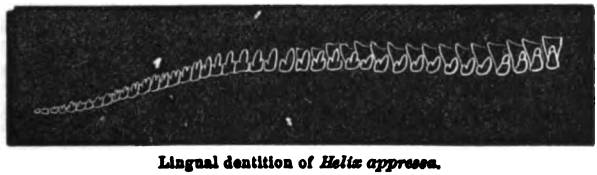
Fig. 214.

Jaw of *Helix appressa.*

The jaw is very strongly arcuate, of uniform width throughout; anterior surface with ribs, denticulating both margins.

Lingual membrane with 105 rows of 40—1—40 teeth each; central long, conical, surmounted with a pointed apex; laterals of same shape, but with an obtuse small side tubercle; uncini with long, irregular denticles.

Fig. 215.



Lingual dentition of *Helix appressa.*

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Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7903	8	St. Louis, Mo.	.....	.....
7904	1	Charleston, S. C.	W. Stimpson.	.....
7905	3	Ft. Bridger.	Lieut. Bryan.	Var. a. True locality?
8029	2	Taylor County, Ga.	Dr. H. M. Neisler.	[W. G. B.
8622	5	.....	W. G. Binney.	Cab. series.
8623	3	Illinois.	R. Kennicott.	"
8715	5	.....	.....	.....
8777	1	Ohio.	.....	.....

Helix inflecta, SAY.—Shell with the umbilicus closed, depressed; epidermis brownish horn-color, with very fine, hair-like projections; whirls five, with very minute, transverse striæ; suture not much impressed; aperture three-lobed, very much contracted; peristome white, narrow, reflected, with a deep groove or indentation behind the reflection, contracting the opening so that the outer edge of the peristome does not project beyond the surface of the whirl; on the inner margin of the peristome are two acute teeth, with the points directed inwards, one near the base, the other midway between that and the junction of the peristome with the body-whirl, with a circular sinus between them, forming one of the lobes of the aperture; parietal wall with a long, arcuated, white tooth; umbilicus covered, its place considerably impressed. Greater diam. 12, lesser 11; height 6¾ mill.

Fig. 216.

Helix inflecta.

Helix inflecta, SAY, Journ. Phila. Acad. II, 153 (1821); ed. BINNEY, 16.—BINNEY, Bost. Journ. Nat. Hist. III, 358, pl. ix, f. 1 (1840); Terr. Moll. II, 143, pl. xlv, f. 2, 3.—DEKAY, N. Y. Moll. 45 (1843).—MRS. GRAY, Fig. Moll. An. pl. cxciii, f. 7 (ex Bost. Journ. no descr.).—W. G. BINNEY, Terr. Moll. IV, 59.—BLAND, Ann. N. Y. Lyc. VII, 425.—PFEIFFER, Mon. Hel. Viv. IV, 319.

Helix clausa, FERUSSAC, Tab. Syst. 38, no. 104; Hist. pl. li, f. 2.—DESHAYES, Encycl. Méth. II, 252 (1830); in LAMARCK, VIII, 114; ed. 3, III, 309; in FER. I, 143.—PFEIFFER, Mon. Hel. Viv. I, 420; in CHEMNITZ, 2d ed. I, 368, t. lxiv, f. 25, 26.—REEVE, Con. Icon. no. 704 (1852).

Xolotrema clausa, RAFINESQUE, Enumeration, &c. 3 (1831); ed. BINNEY and TRYON, 68.

Isognomostoma inflecta, TRYON, Am. Journ. Conch. III, 54, pl. ix, f. 10 (1867).

From Texas to the Appalachian chain in Pennsylvania and New York; from Georgia through the northwestern States; also in the postpleiocene of the Mississippi Valley.

The large specimen figured is from University Place, Tenn.

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Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7910	8	Columbus, Ohio.	Dr. J. Lewis.	.....
7911	1	L'eau qui Court.	.....	Imperfect.
7960	1	Milwaukee, Wis.	I. A. Lapham.	.....
7962	7	N. Georgia.	A. Gerhardt.	.....
8606	4	Alabama.	W. G. Binney.	Cab. series.
8966		Hot Spr., Ark.	Dr. B. Powell.	.....

Helix rugeli, SHUTTLEWORTH.—Shell imperforate, orbicularly-convex, with granulate striations and few hairs, waxen horn-color; spire short, obtuse; whirls five and a half, rather convex, the last suddenly falling in front, and strongly contracted at the aperture; aperture depressed, narrowed by a tongue-shaped, flexuose, strong, parietal denticle; peristome reflected, within thickened, its right termination with a large, obtuse, very deeply-seated tooth (whose position is marked on the exterior of the shell by a groove or pit), the basal terminus furnished with a smaller, transverse, submarginal denticle. Greater diam. 13, lesser 11½; height 6½ mill.

Fig. 217.

Helix rugeli, enlarged.

Helix rugeli, SHUTTLEWORTH, Bern. Mittheil. 1852, 198.—PFEIFFER, Mon. Hel. Viv. III, 268.—GOULD in Terr. Moll. III, 18.—W. G. BINNEY, Terr. Moll. IV, 60, pl. lxxviii, f. 15.—BLAND, Ann. N. Y. Lyc. VII, 426.

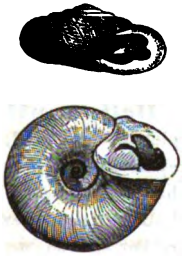
Isognomostoma rugeli, TRYON, Am. Journ. Conch. III, 55, pl. ix, f. 8 (1867).

Tennessee, North Carolina.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8638	1	Tennessee.	W. G. Binney.	Cab. series.

Helix tridentata, SAY.—Shell umbilicated, orbicularly-depressed, with crowded rib-like striæ, light horn or chestnut-colored; spire very short; whirls five and a half, rather convex, the last scarcely deflected in front; aperture lunar, subtriangular; peristome white, reflected, its outer contour rounded, thickened within, its terminations converging, joined by a light deposition of callus bearing a tongue-like, erect, entering tooth, both the right and basal portions bearing on the inner margin a stout, acute denticle. Greater diam. 16, lesser 14; height 8 mill.

Fig. 218.



Helix tridentata.

Helix tridentata, SAY, Nich. Encycl. pl. ii. f. 1 (1817, 1818, 1819); BINNEY's ed. 6, pl. lxx, f. 1.—EATON, Zool. Text-Book, 193 (1826).—

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Férussac, Tab. Syst. 38; Hist. pl. li, f. 3.—Wood, Ind. Supplem. 21, pl. vii, f. 2 (1828); ed. Hanley, 226, f. 11.—Deshayes, Encycl. Méth. II, 213 (1830); in Lam. VIII, 115; ed. 3, 309; in Fér. *l. c.* I, 72.—Binney, Bost. Journ. Nat. Hist. III, 382, pl. xvii (1840), part; in Terr. Moll. II, 183, pl. xxvii.—DeKay, N. Y. Moll. 28, pl. ii, f. 7 (1843).—Adams, Vermont Mollusca, 160 (1842).—Gould, Invertebrata, 173, f. 115 (1841).—Pfeiffer, Mon. Hel. Viv. I, 412; in Chemnitz, 2d ed. I, 84, pl. x, f. 7, 8.—Potiez et Michaud, Gal. I, 114.—Mrs. Gray, Fig. Moll. An. pl. ccxci, f. 3 (ex Bost. Journ., no descr.).—Reeve, Con. Icon. no. 690 (1852).—W. G. Binney, Terr. Moll. IV, 70.—Bland, Ann. N. Y. Lyc. VII, 423.—Morse, Amer. Nat. I, 150, f. 8, 9 (1867).

Triodopsis lunula, Rafinesque, En. and Acc. 3; ed. Binney and Tryon, 68.

Triodopsis tridentata, Tryon, Am. Journ. Conch. III, 50, pl. ix, f. 6, 13 (1867).

—— Lister, pl. xcii, f. 92.

Fig. 219.

Helix tridentata, deformed.

From Canada through all eastern North America. One of the specimens figured is unusually large. A curious pathological specimen, with a double peristome, is here figured.

The lingual membrane is broad; central teeth long, conical, with an acutely pointed apex; laterals of the same shape, but with a small side-cusp; uncini with long irregular denticles.

Fig. 220.

Lingual dentition of *Helix tridentata*. [Leidy.]

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8011	10	Centre County, Pa.	.....	.....
8013	16	.....	.....	Series of sizes.
8013	2	Marietta, Ohio.	W. Holden.	.....
8612	3	.....	W. G. Binney.	Cab. series.

Helix mullani, Bland.—Shell with umbilicus partially covered, globose-depressed, dark horn-colored, irregularly striated, having a thin epidermis with microscopic spiral lines, and tubercles (the latter with hairs?); beneath the epidermis shining; spire short; whirls five and a half to six, convex, the last gibbous above, scarcely descending, the base rather smooth, much constricted at the aperture; aperture subtriangular, oblique, with a short, white, linguiform, parietal tooth; peristome white,

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or reddish horn-colored, thickened, expanded, and roundly reflected, with two teeth on the margin of the callus, the lower one lamelliform, the other small, often obsolete, the columellar margin partially covering the middling-sized, pervious umbilicus. Greater diam. 13½, lesser 11; height 7 mill.

Fig. 221.

Helix mullani.

Helix mullani, Bland & Cooper, Ann. N. Y. Lyc. VII, 363, pl. iv. f. 16, 17 (1861).

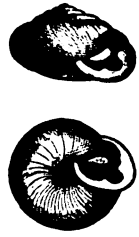
Triodopsis mullani, Tryon, Am. Journ. Conch. III, 52, pl. ix, f. 15 (1867).

Dead specimens found near Cœur d'Alêne Mission, Cœur d'Alêne Mountains; living ones on the west side of the Bitter Root Mountains, Washington Territory; St. Joseph's River, 1st Camp, Oregon. Under logs and in dry pine woods.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9148	1	St. Joseph's River, 1st [Camp, Oregon.	T. Bland.	Type.

Helix fallax, Say.—Shell umbilicated, depressed-globose, with rib-like striæ, reddish horn-colored; spire convex; whirls six, rather convex, the last deflected anteriorly, constricted; aperture trilobed, contracted by a large, oblique, tongue-shaped, arcuately-entering tooth on the parietal wall; peristome reflected, thickened within, white, with two teeth, the upper one bending inward not on the edge, the other subbasal. Greater diam. 13, lesser 11; height 7½ mill.

Fig. 222.



Helix fallax.

Helix fallax, Say, Journ. Phila. Acad. V, 119 (1825); Binney's ed. 27.—DeKay, N. Y. Moll. 28, pl. iii, f. 23 (1843).—Pfeiffer, Mon. Hel. Viv. I, 412; in Chemnitz, ed. 2, I, 364, pl. lxiv, f. 7-9.—Reeve, Con. Icon. no. 686 (1852).

Helix tridentata, Binney, part, Bost. Journ. Nat. Hist. III, 382, pl. xviii, f. 3 (1840); Terr. Moll. II, 183, pl. xxviii.—W. G. Binney, Terr. Moll. IV, 72.

Triodopsis fallax, Tryon, Am. Journ. Conch. III, 51, pl. ix, f. 12 (1867).

From Canada to Texas and Florida.

Nearly allied to *H. tridentata*, but in this, the spire is more elevated, and sometimes has six full volutions. There is a deep groove behind the peristome, contracting the aperture; the peristome is widely reflected, and directed inwards, forming a basin-shaped mouth; the upper tooth on the peristome is broader,

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sometimes bifid, and even trifid, and very much inflected; the parietal tooth extends quite to the base of the shell, and unites with the extremity of the peristome; the aperture is nearly filled up by the teeth and the contraction of the peristome.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7901	7	Hiram, Ohio.	S. M. Luther.	.....
7902	1	L'eau qui Court.	.....	.....
8021	5	Columbus, Ohio.	Dr. J. Lewis.	.....
8614	4	" "	"	Cab. series.

Helix introferens, BLAND.—Shell umbilicate, globose, depressed, thin, with rib-like striæ, yellowish horn-colored; spire convex; whirls six, moderately convex, the last scarcely descending, much constricted at the aperture, with two exterior pits, subangular at the periphery, convex beneath, grooved within the umbilicus; aperture oblique, lunate, with a well-developed, arcuate parietal tooth; peristome white, thickened within, reflected; on the right margin an obtuse inflected tooth, at the base a submarginal lamelliform tooth, with transverse tubercle in the centre; the basal lamella continued within the aperture, where it forms a strong white tubercle. Greater diam. 15, lesser 13; height 7 mill.

Fig. 223.

Helix introferens.

Helix introferens, BLAND, Ann. N. Y. Lyc. VII, 117, pl. iv, f. 3, 4 (1860).
Triodopsis introferens, TRYON, Am. Journ. Conch. III, 51, pl. ix, f. 5 (1867).

Gaston County, N. C.; Salem, N. C.

This shell is closely allied to *H. vultuosa*, and also to *H. fallax*. It differs from the latter in the narrower umbilicus, which only shows the penultimate whirl; in the groove in the last whirl within the umbilical opening, the character of the basal tooth, and the internal tubercle, which does not prevail in *fallax* and its immediate alliés *tridentata* and *hopetonensis*. In *H. introferens* the upper tooth is less deeply seated and less inflected, and the basal one is broader, and more elevated than in *vultuosa*, the parietal tooth is more arcuate, being indeed subangular, but is without the indication, noticeable in *vultuosa*, of a callus extending from its lower termination towards the upper angle of the peristome. *H. vultuosa* is even smaller than the var. *minor* of this species, which is only 11 mill. in diameter.

Helix hopetonensis, SHUTTLEWORTH.—Shell with a narrow, scarcely pervious umbilicus, depressed-globose, with numerous rib-like

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striæ, olive horn-color; spire obtuse, convex; whirls five and a half, rather convex, the last scarcely deflected in front, constricted at the aperture; aperture lunar, tridentate; a moderate, tongue-shaped, slightly entering parietal denticle; peristome reflected, within thickened with a white, light callus, its right margin with a small, somewhat anterior denticle, its basal terminus with a marginal denticle. Greater diam. 13, lesser 11; height 6 mill.

Fig. 224.

Helix hopetonensis.

Helix hopetonensis, Shuttleworth, Bern. Mitt. 1852, 198.—Reeve, Con. Icon. no. 709 (1852).—Pfeiffer, Mon. Hel. Viv. III, 263; in Chemnitz, ed. II, 420, pl. cxlviii, f. 17, 18 (pl. lxiv, f. 7-9?).—Gould, Terr. Moll. III, 17.—W. G. Binney, Terr. Moll. IV, 72, pl. lxxvii, f. 16.

Helix tridentata, var., Binney in Bost. Journ. Nat. Hist. III, 382, pl. xviii, f. 2.—Férussac, Hist. pl. li, f. 3, small fig. on the left.

Helix tridentata, var. *epliabus*, Say, of Ravenel's Cat. 9 (1834), no descr.

Triodopsis hopetonensis, Tryon, Am. Journ. Conch. III, 52, pl. ix, f. 9 (1867).

Georgia and Florida.

It differs from *H. fallax* in its smaller, scarcely pervious umbilicus, its deeper color, lighter peristome, and denticles being more widely separated.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7926	6	Georgia.	W. G. Binney.	.....
8600	11	St. Simon's Isle, Ga.	Dr. J. Lewis.	Cab. series.
8773	2	Georgia.	W. Stimpson.	.....
6791	6	South Carolina.	"	Cab. series.
9195	2	" "	Gen. Totten.	(*epliabus.*)
9191	3	Fernandina.	"	.....

Helix vultuosa, Gould.—Shell umbilicated, orbicular, depressed, about equally convex on both sides, rather solid, dark horn-color, delicately striated; spire a low dome, composed of about five and a half whirls, which are moderately convex, and separated by a well-defined suture, the exterior one somewhat angular at periphery; beneath, well rounded, and perforated by a deep umbilicus, about one-fourth as broad as the base; aperture rather large, lunate; peristome moderately reflexed, tortuous, white, having at the base a small tooth, and at the centre a deeply-seated, more expanded, reflexed tooth; the parietal wall bears a stout, elevated, arcuated, oblique lamella, joined to the lower extremity of the peristome only; on the base of the shell is a transverse internal tubercle. Greater diam. 10, lesser 9; height 5½ mill.

Fig. 225.

Helix vultuosa.

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Helix vultuosa, GOULD, Proc. Bost. Soc. Nat. Hist. III, 39 (1848); in Terr. Moll. II, 189, pl. xl, a, f. 4.—REEVE, Con. Icon. no. 711 (1852).—PFEIFFER, Mon. Hel. Viv. III, 263; in CHEMNITZ, ed. 2, III, 305, pl. cxxvii, f. 10–12.—W. G. BINNEY, Terr. Moll. IV, 75.—BLAND, Ann. N. Y. Lyc. VII, 439, pl. iv, f. 21.

Triodopsis vultuosa, TRYON, Am. Journ. Conch. III, 53, pl. ix, f. 14 (1867).

Arkansas and Texas.

Helix loricata, GOULD.—Shell umbilicated, depressed, spire less convex than the base, thin, of a yellowish-green color, having the surface everywhere ornamented with small, crescent-formed scales of the epidermis, in relief, arranged along the lines of growth, and in quincunx; whirls five and a half, slightly convex, separated by a deeply impressed suture, and forming a low, conical spire; the periphery of the last whirl is slightly angular near its posterior portion; the base is rounded, tending rapidly to a deep, umbilical depression, with a small perforation; aperture small, very oblique, crescentic, having a small, acute tooth on the right margin of the peristome, a transversely oblong one at basal margin, and a prominent, compressed, curved, nearly horizontal one on the parietal wall, thus giving a three-lobed outline to the aperture; peristome white, slightly reflected, having a very profound constriction of the whirl directly behind it; on the base of the shell is an internal, transverse tubercle. Greater diam. 6, height 3½ mill.

Fig. 226.

Helix loricata, enlarged.

Helix loricata, GOULD, Proc. Bost. Soc. Nat. Hist. II, 165 (1846); Moll. Expl. Exped. 68, f. 39, a, b, c.; T. M. U. S. II, 145, pl. xxix a, f. 1.—PFEIFFER, Mon. Hel. Viv. I, 416.—W. G. BINNEY, Terr. Moll. IV, 11.

Helix lecontii, LEA, Trans. Am. Phil. Soc. X, 303, pl. xxx, f. 13; Obs. V, 59 (1853).—PFEIFFER, formerly, Mon. Hel. Viv. III, 265.

Triodopsis loricata, TRYON, Am. Journ. Conch. III, 54, pl. ix, f. 16, 19 (1867).

California, near San Francisco, to Klamath Co.

Cat No.	No. of Sp.	Locality.	From whom received.	Remarks.
8360	1	.....	.....	Cab. series.
8725	1	San Francisco.	Rowell.	.....

SUBGENUS **MESODON**, Raf.

Shell umbilicated, or with the umbilicus closed, subglobose or orbicularly depressed, thin, delicately striate, sometimes decussatedly sculptured; whirls 5–6, regular; aperture rotundly lunar,

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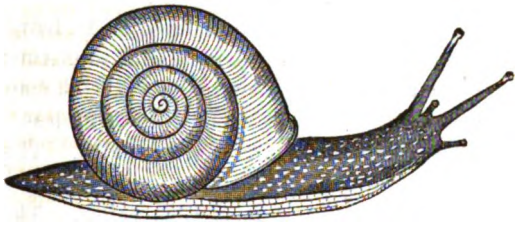
sometimes narrowed by a small denticle on the parietal wall; peristome white-lipped, expansively reflexed, its basal margin sometimes unidentate.

Animal (of *H. albolabris*) varying from pure white and cream color, through various shades of gray to blackish; upper part of head and neck slightly brownish; extremities of eye-peduncles smoky; eyes black. Eye-peduncles more than 12 mill. in length

Fig. 227.

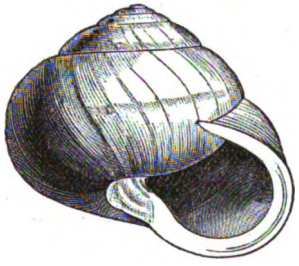


Animal of *Helix albolabris*.

when fully extended, slender and cylindrical. Foot with a slightly expanded margin terminating posteriorly in an acute angle. Glandular tubercles very distinct and prominent, on the back arranged longitudinally, on the eye-peduncles long and narrow. Extreme length 62 mill.

Helix major, Binney.—Shell imperforate, conoidly-subglobose, solid, with crowded, fold-like striæ, and a few interstitial microscopic revolving lines; reddish horn-color or chestnut; spire conoid, the apical point small; whirls six, convex, the last ventricose, scarcely descending in front; aperture diagonal, roundly lunate, whitish within; peristome with a white thickening, its terminations joined by a thin callus, the right and basal portions rather broadly expanding and reflected, the columellar portion subdentate, dilated, subexcavated, adhering. Greater diam. 37½, lesser 31; height 26 mill.

Fig. 228.



Helix major.

Helix major, Binney, Bost. Journ. Nat. Hist. I, 473, pl. xii (1837); Terr. Moll. II, 96, pl. i.—DeKay, N. Y.

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Moll. 45 (1843).—Mrs. Gray, Fig. of Moll. An. pl. cexci, f. 1, from Bost. Journ., no descr.—W. G. Binney, Terr. Moll. IV, 43.—Pfeiffer, Mon. Hel. Viv. IV, 320.

Helix albolabris, var., Ferussac, Hist. pl. xliii, f. 4; pl. xlvi, a, f. 7.—Deshayes in Fer. part.—Pfeiffer, Symbolæ, II, 22; Mon. Hel. Viv. I, 290; in Chemnitz, ed. 2, I, 81.—Reeve, Con. Icon. 656.—Bland, N. Y. Lyc. VI, 359.

Mesodon major, Teton, Am. Journ. Conch. III, 43, pl. viii, f. 5 (1867).

Tennessee, Alabama, Florida, Georgia, and South Carolina.

It is much more globose than *H. albolabris*, of a coarser and more solid texture, and the striæ of increase are much more raised and prominent, so much so, indeed, as to leave distinct grooves between them. The revolving striæ, so distinct on that shell, are either wanting or very indistinct. The aperture is smaller in proportion to the size of the shell, less flattened towards the plane of the base, and more rounded. The parietal wall and umbilicus are in many instances covered with a smooth and shining, semi-transparent, testaceous callus. The margin of the peristome is thickened, the peristome itself is narrower, less abruptly reflected, and not so much flattened, and there is often a tooth-like process on the inner and upper side of the margin near the umbilicus. The color of the epidermis is generally much darker. The only considerable variation in the characters of the shell is caused by the depression of the spire in some individuals, and indeed in all specimens from certain localities. In its most perfect condition it is often subconical. It is subject to some irregularities in the form of the aperture, and there is sometimes an indication of pale bands in the epidermis of the body-whirl.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8633	1	Georgia.	W. G. Binney.	Cab. series.
8837	1	Eastern Georgia.	Dr. Jones.	.....
9193	1	Alabama.	Gen. Totten.	.....
9171	1	.....	.....	.....

Helix albolabris, Say.—Shell imperforate, convex; epidermis immaculate, of a uniform yellowish-brown, russet, or light chestnut-color; whirls between five and six, with fine parallel striæ running obliquely across them, and spirally striated with very minute and delicate, but distinct, wavy, impressed lines, which are most apparent on the back of the reflected peristome; suture well marked and distinct; aperture contracted by the peristome; peristome white, flattened in the plane

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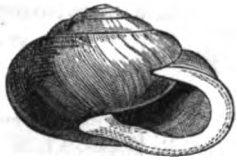
of the mouth, abruptly and very widely reflected; umbilicus of the mature shell covered by the reflected peristome, which is continued to the base of the shell. Greater diam. 36, lesser 26; height 17 mill.

Fig. 229.



Helix albolabris.

Helix albolabris, Say, Nich. Encycl. pl. i, f. 1 (1817, 1818, 1819); Journ. Acad. Nat. Sci. Philad. II, 161 (1821); American Conch. No. 2, pl. xiii, (1831); Binney's ed. 21, pl. lxix, f. 1.—Chemn, Bibl. Conch. III, 21, pl. iii, f. 3, a.—Adams in Thompson's Vermont, I, 158, with wood-cut.—Eaton, Zool. Text-Book, 193 (1826).—Ferussac, Tab. Syst. 36; Hist. pl. xliii, f. 1, 2, 3.—Binney, Bost. Journ. Nat. Hist. I, 475, pl. xiii (1837); Terr. Moll. II, 99, pl. ii.—DeKay, N. Y. Moll. 26, pl. ii, f. 12 (1843).—Gould, Invert. 170, f. 101 (1841).—Leidy, T. M. I, 252, pl. vi (1851), anat.—Pfeiffer, Symb. II, 22, excl. γ and δ; Mon. Hel. Viv. I, 290, excl. β and γ; in Chemnitz, ed. 2, I, 81, pl. xv, f. 7, 8 (1847), excl. var. C and D, pl. x, f. 4, 5.—Potiez et Michaud, Gal. I, 69.—Reeve, Con. Icon. no. 624.—Deshayes in Fer. I, 137, pl. xliii, f. 1, 2, 3, 5.—Billings, Canadian Nat. and Geol. 1857, II, 98, f. 2, 3.—Bland, Ann. N. Y. Lyc. VI, 358 (1858).—W. G. Binney, Terr. Moll. IV, 43.—Morse, Amer. Nat. I, 6, pl. i, f. 1–11; 96, f. 2 (1867).

Helix rufa, DeKay? N. Y. Moll. 44, pl. iii, f. 30 (1843).

Mesodon albolabris, Morse, Journ. Portl. Soc. I, 8, f. 7, pl. iii, f. 8 (1864).—Tryon, Am. Journ. Conch. III, 39, 44, pl. vii, f. 5–7 (1867).

Canada to Arkansas, Georgia to Minnesota. Also in the postpleiocene of the Mississippi Valley.

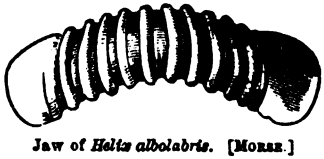
Fig. 230.

Helix albolabris, var.

Specimens of *H. albolabris* are sometimes found bearing a well-developed parietal tooth. Such are very plenty in the Alleghany Mountains in Pennsylvania. One is here figured (Fig. 230).

The saffron-colored jaw of *H. albolabris* is arcuate, of uniform breadth throughout; ends blunt, smooth on their anterior surface, the balance of the jaw with stout ribs, denticulating either margin.

Fig. 231.



Jaw of *Helix albolabris*. [Morse.]

The lingual membrane has 123 rows of 44—1—44 teeth each; centrals long, conical, with an acute apex; laterals of same shape,

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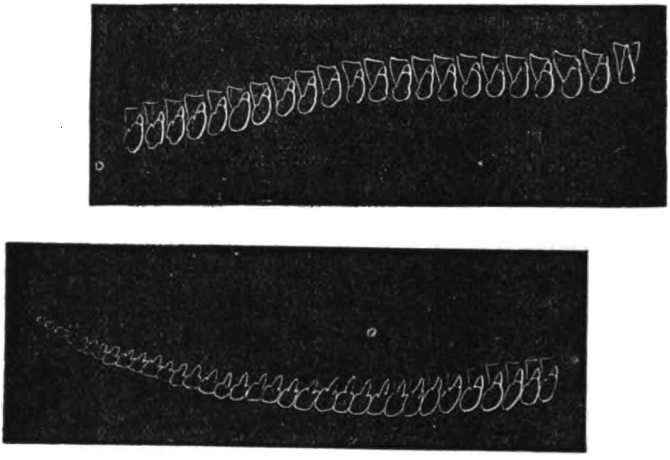
but with an obsolete, small side-cusp; uncini a modification of laterals, with one long and one short cusp.

Fig. 232.



Lingual dentition of *Helix albolabris*. [MORSE.]

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7978	2	Grand Rapids, Mich.	.....	.....
7979	1	L'eau qui Court.	.....	.....
7980	1	.....	.....	.....
7981	3	Eastern Tennessee.	.....	Allied to *H. major*.
7982	4	Fleming, Centre Co., Pa.	.....	.....
7983	3	..... [B., Me.	.....	Allied to *H. major*.
7984	4	Broken Cave Isl., Casco	Dr. J. Lewis.	Local var.
7985	1	Milwaukee, Wis.	I. A. Lapham.	.....
7986	2	Eagle Isl., Casco B., Me.	Dr. J. Lewis.	Local var.
8441	1	Rock River, Wis.	.....	.....
8601	2	.....	W. G. Binney.	Cab. series.
8602	2	.....	"	"
8744	1	.....	.....	.....
8756	2	Massachusetts.	W. Stimpson.	.....
8763	4	"	"	.....
8779	13	.....	"	.....
8838	2	Eastern Georgia.	Dr. Jones.	.....
9174	200+	Vermont.	J. E. Chittenden.	.....
8964		Hot Springs, Ark.	Dr. B. Powell.	.....

Helix divesta. GOULD.—Shell imperforate, depressed, somewhat discoidal, of medium thickness and a dingy horn-color, sculptured with coarse oblique furrows; spire slightly convex, whirls about six, a little convex, and separated by a well-impressed suture; the outer whirl is a little angular at its periphery; beneath, it is more smooth, moderately convex, with the central region excavated, and covered with a glazing of

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white callus; the aperture is lunate, and very oblique; the peristome is white, broadly reflected, its basal portion horizontal, and its outer portion flexuous. Greater diam. 20, lesser 15; height 8 mill.

Fig. 233.

Helix divesta.

Helix dejecta, Gould, Terr. Moll. II, 91.

Helix abjecta, Gould, Proc. Bost. Soc. Nat. Hist. III, 40 (Oct. 1848); Terr. Moll. II, 122, pl. xiii, a, f. 2.—Pfeiffer, Mon. Hel. Viv. III, 270.

Helix divesta, Gould, Terr. Moll. II, 357.—W. G. Binney, Terr. Moll. IV, 51.—Pfeiffer, Mon. Hel. Viv. IV, 322.

Mesodon divesta, Tryon, Am. Journ. Conch. III, 45, pl. viii, f. 11 (1867).

Washita Springs, Arkansas.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8967		Hot Springs, Ark.	Dr. B. Powell.	.....

Helix multilineata, Say.—Shell imperforate, depressed-subglobose; spire convex; rather thin; epidermis yellowish-brown, or russet color, with numerous reddish-brown, finely undulated, revolving lines and bands; whirls between five and six, convex, with delicate, parallel, oblique striæ, the last ventricose; suture distinctly marked: aperture lunate, slightly contracted by the peristome; peristome white, not much expanded, reflected, rather thin; umbilical region impressed. Greater diam. 23, lesser 20; height 14 mill.

Fig. 234.

Helix multilineata.

Helix multilineata, Say, Journ. Acad. Phila. II, 150 (1821); ed. Binney, 15.—Ferussac, Hist. pl. xlvi, a, f. 3.—Binney, Bost. Journ. Nat. Hist. I, 480, pl. xiv (1837); Terr. Moll. II, 103, pl. iii.—Leidy, Terr. Moll. U. S. I, 254, pl. viii, f. 1-6 (1851), anat.—DeKay, N. Y. Moll. 41, pl. iii, f. 34 (1843).—Pfeiffer, Symb. ad Hist. Hel. I, 41; Mon. Hel. Viv. I, 290; in Chemnitz, ed. 2, II, 41, pl. lxxi, f. 17-19 (1849).—Reeve, Con. Icon. no. 691 (1852).—Desh. in Fer. I, 113.—W. G. Binney, Terr. Moll. IV.

Mesodon multilineata, Tryon, Am. Journ. Conch. III, 45, pl. viii, f. 8 (1867).

In the States bordering on the Ohio River, from New York to Minnesota. I have heard of a single specimen being found near Philadelphia.

The specimens figured show how variable the species is in size.

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In color it is also very variable, sometimes it is found of an uniform red, at others albino.

[Fig. 235.

Jaw of *Helix multilineata.*

Jaw arcuate, of uniform width; ends blunt; anterior surface with numerous, crowded ribs, denticulating either margin.

The teeth on the lingual membrane are arranged 42—1—42; centrals with a long, acutely-pointed middle cusp, and an enlargement at either side of its base; laterals

Fig. 236.

Lingual dentition of *Helix multilineata.*

with a long, acutely-pointed cusp, and a short, obsolete side-cusp; uncini large, irregularly bidentate or tridentate.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7940	1	Milwaukee, Wis.	I. A. Lapham.	.....
7958	5	Grand Rapids, Mich.	Dr. J. Lewis.	.....
7959	1	Milwaukee, Wis.	I. A. Lapham.	Small form.
8598	4	.....	W. G. Binney.	Cab. series.
8599	1	.....	"	"
8831	1	Grand Rapids, Mich.	T. Bland.	.....

Helix pennsylvanica, GREEN.—Shell imperforate, convex, elevated; epidermis yellowish horn-color, or russet; whirls six, convex, with crowded, elevated, oblique striæ; suture distinctly marked; aperture subtriangular, contracted by the peristome; peristome white, narrow, reflected, not flattened, with sometimes a slight thickening on the inner side near the base; umbilical region indented. Greater diam. 17, lesser 15; height 11 mill.

Fig. 237.

Helix pennsylvanica.

Helix pennsylvanica, GREEN, Contributions to Macl. Lyc. No. 1, 8.—BINNEY, Bost. Journ. Nat. Hist. I, 483, pl. xvi (1837); Terr. Moll. II, 105, pl. vii. —PFEIFFER, Symbolæ, II, 36; Mon. Hel. Viv. I, 291 (excl. *H. clausa*); IV, 321; in CHEMNITZ, ed. 2, II, 51, t. lxxiii, f. 4, 5 (excl. *H. clausa*).—DEKAY. N. Y. Moll. 41, pl. iii, f. 35 (1843).—MRS. GRAY, Fig. Moll. An. pl. ccxci, f. 5, from Bost. Journ., no descr.—REEVE, Con. Icon. no. 676 (excl. syn.).—BLAND, Ann. N. Y. Lyc. VI, 299 (1858).—W. G. BINNEY, Terr. Moll. IV, 45.

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Helix mitchelliana, Desh. in Fer. I, 137, pl. xcvii, f. 4–7, nec 13–16.
Mesodon pennsylvanica, Tryon, Am. Journ. Conch. III, 44, pl. viii, f. 9 (1867).

Western part of Pennsylvania, Ohio, Illinois, Kentucky.

This species may be readily distinguished from *clausa* and *mitchelliana* by its somewhat triangular aperture, which is more like that of *H. elevata;* it is more elevated, has usually six whirls, more convex, and with deeper suture than in *H. clausa.* In mature shells the inner margin of the peristome, near the columella, has a tooth-like callus, very similar to that often prevailing in forms of *H. exoleta, thyroides,* and *albolabris.* The umbilicus is invariably more or less open in *H. clausa,* but closed in *H. pennsylvanica* and *mitchelliana.*

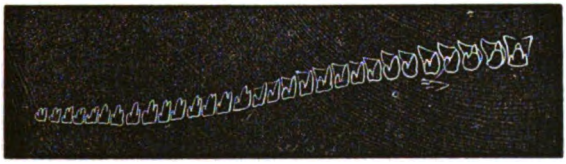
Fig. 238.

Jaw of *Helix pennsylvanica.*

Jaw very arcuate, of uniform width; ends blunt; anterior surface with stout, crowded ribs, denticulating either margin.

Lingual membrane with 120 rows of 29—1—29 teeth each; centrals short, broad, with a conical, acutely-pointed middle cusp, and obsolete side-cusps; laterals

Fig. 239.



Lingual dentition of *Helix pennsylvanica.*

of same shape, but bicuspid; uncini large, irregularly denticulated.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7925	4	Columbus, Ohio.	Dr. J. Lewis.	.....
8042	2	.....	.....	.....
8394	3	.....	W. G. Binney.	Cab. series.
8767	1	.....	W. Stimpson.	.....

Helix mitchelliana, Lea.—Shell imperforate, depressed-conoid-globose, thin, with crowded striæ and very crowded decussating microscopic lines, pellucid, horn-color, polished; spire briefly conoid; whirls five, moderately convex, gradually increasing, the last ventricose, subconstricted and briefly deflected anteriorly; aperture diagonal, lunate, sub-

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pearlaceous within; peristome white, thickened, its terminations slightly converging, subequally reflected, that of the columella narrow, adherent, or subdilated and spreading. Greater diam. 16½, lesser 14½; height 10 mill.

Fig. 240.

Helix mitchelliana.

Helix mitchelliana, Lea, Am. Phil. Trans. VI, 87, pl. xxiii, f. 71; Obs. II, 87 (1839); Troschel, Arch. f. Nat. 1839, II, 221.—DeKay, N. Y. Moll. 45 (1843).—Pfeiffer, Mon. Hel. Viv. I, 291; IV, 322.—Bland, Ann. N. Y. Lyc. VI, 339 (1858).—W. G. Binney, Terr. Moll. IV, 47.

Helix clausa, Binney, Terr. Moll. II, 109; in Vol. III, pl. iv, outline figs.

Mesodon mitchelliana, Tryon, Am. Journ. Conch. III, 45, pl. viii, f. 10 (1867).

Kentucky and Ohio.

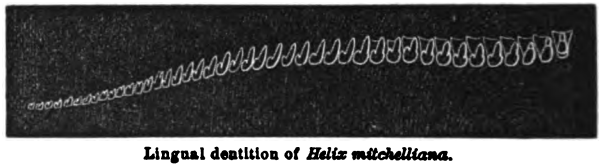
Jaw arcuate, of uniform width throughout; ends blunt; anterior surface with crowded, coarse ribs, denticulating either margin.

Fig. 241.

Jaw of *Helix mitchelliana.*

Lingual membrane with 136 rows of 42—1—42 teeth each; centrals long, stout, with a long, conical, pointed apex; laterals of same shape, but with an obsolete side-cusp; uncini bidentate, the inner denticle very long, outer uncini with subequal denticles.

Fig. 242.



Lingual dentition of *Helix mitchelliana.*

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8032	2	Columbus, Ohio.	Dr. J. Lewis.	.....
8037	4	" "	I. A. Lapham.	.....
8630	4	" "	Dr. J. Lewis.	Cab. series.
8776	1	Ohio.	.....	.....

Helix elevata, Say.—Shell imperforate, very convex, elevated, almost conical; epidermis yellowish horn-color; whirls nearly seven, rounded, with fine oblique transverse striæ, the last ventricose; suture distinct; aperture contracted by the peristome, somewhat triangular; peristome white, thickened, reflected, its basal portion with an obsolete, lamellar denticle; parietal wall with a large, white, robust, obliquely-

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curved tooth; umbilicus covered. Greater diam. 25, lesser 20; height 7 mill.

Fig. 243.

Helix elevata.

Helix elevata, Say, Journ. Acad. Phila. II, 154 (1821); American Conchology, No. 4, pl. xxxvii, f. 2 (1832); Binney's ed. 27, pl. xxxvii, f. 2; ed. Chenu, Bibl. Conch. III, 48, pl. xiii, f. 2, a.—Binney, Bost. Journ. Nat. Hist. I, 490, pl. xix (1837); Terr. Moll. II, 126, pl. iv.—Leidy, T. M. U. S. I, 256, pl. x, f. 4, 5 (1851), anat.—DeKay, N. Y. Moll. 36, pl. iii, f. 20 (1843).—Mrs. Gray, Fig. Moll. An. pl. cxci, f. 7, no descr.—Pfeiffer, Symb. Hist. Hel. II, 27; Mon. Hel. Viv. I, 317; in Chemnitz, ed. 2, I, 56, pl. vii, f. 11, 12 (1846).—Reeve, Con. Icon. no. 681 (1852).—Deshayes in Fer. I, 329.

Helix tennesseensis, Lea, Trans. Am. Phil. Soc. IX, 1; Obs. IV, 1 (1844); Proc. II, 31 (1841); Troschel's Arch. f. Nat. 1837, II, 124.

Helix knoxvillina, Ferussac, Hist. pl. xlix, f. 5, 6.

Xolotrema elevata, Tryon, Am. Journ. Conch. III, 48, pl. ix, f. 1 (1867).

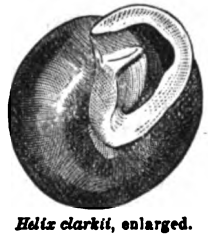
From Georgia to Wisconsin; from New York to Missouri; not east of the Alleghanies. Also in the postpleiocene of the Mississippi Valley.

There is a form furnished with a brownish, revolving band upon the body-whirl.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8028	3	Banks of Tennessee Riv.	A. Gerhardt.	. ....
8621	2	.....	W. G. Binney.	Cab. series.
8747	1	.....	.....	.....
8765	2	.....	.....	.....

Helix clarkii, Lea.—Shell imperforate, globosely-rounded, regularly and finely striated, reddish horn-color; spire obtusely conic; whirls seven, convex, with delicate incremental striæ, the last one very globose and rounded below; aperture lunate; peristome white, thickened, reflected, its basal termination quite heavy and covering the umbilicus entirely; one elongated, white denticle on the parietal wall of the aperture. Greater diam. 14, lesser 13; height 9 mill.

Fig. 244.



Helix clarkii, enlarged.

Helix clarkii, Lea, Proc. Acad. Nat. Sci. Philad. 1858, 41; Journ.—; Obs. XI, 138, pl. xxiv, f. 111.—W. G. Binney, Terr. Moll. IV, 53, pl. lxxvii, f. 10.

Xolotrema clarkii, Tryon, Am. Journ. Conch. III 48, pl. ix, f. 2 (1867).

Cherokee County, N. C.; also in Georgia.

The lower figure was photographed on to the wood.

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Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8830	1	Cherokee County, N. C.	T. Bland.	.....
8834	2	Eastern Georgia.	Dr. Jones.	Cab. series.

Helix christyi, BLAND.—Shell imperforate, depressed, rather solid, with numerous oblique rib-like striæ, dark horn-colored; spire short, obtuse; whirls four and a half, rather convex, the last descending at the aperture, slightly angular at the periphery, constricted, above gibbous; base convex, excavated in the middle; aperture depressed, with a strong, oblique, lamelliform parietal tooth; peristome reflected, with a white callus within. Greater diam. 10, lesser 8; height 4½ mill.

Fig. 245.

Helix christyi.

Helix christyi, BLAND, Ann. N. Y. Lyc. VII, 117, pl. iv, f. 5, 6, (1860).

Mesodon christyi, TRYON, Am. Journ. Conch. III, 40, pl. vii, f. 11, (1867).

Mountains in Cherokee County, N. C.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8829	1	Cherokee County, N. C.	T. Bland.	.....

Helix exoleta, BINNEY.—Shell imperforate, convex, somewhat ventricose; epidermis of a uniform, yellowish-horn, or russet-color; whirls between five and six, with fine, parallel striæ crossing them obliquely; body-whirl large and ventricose; suture well-marked and distinct; aperture rounded, contracted by the peristome, the plane of the aperture making a considerable angle with the plane of the base; peristome thickened, white, reflected, its basal portion subdentate; parietal wall with a prominent, white, oblique tooth; umbilicus covered. Greater diam. 28, lesser 23; height 17 mill.

Fig. 246.

Helix exoleta.

Helix exoleta, BINNEY, Terr. Moll. II, 131, pl. x.—LEIDY, T. M. U. S. 256, pl. x, f. 1–3, anat.—DEKAY, N. Y. Moll. 27, pl. ii, f. 6.—W. G. BINNEY, Terr. Moll. IV, 54.

Helix zaleta, BINNEY, Bost. Journ. Nat. Hist. I, 492, pl. xx.—MRS. GRAY, Fig. Moll. An. pl. cxci, f. 9, from Bost. Journ., no descr.—PFEIFFER, Mon. Hel. Viv. I, 316.—DESHAYES in FER. I, 139.—REEVE, Con. Icon. no. 622 (1852).

Helix albolabris, var., FERUSSAC, pl. xlvi, a, f. 6.—PFEIFFER, Symb. II, 22 (no descr.); in CHEMNITZ, ed. 2, I, 81, pl. x, f. 19, 20.

Mesodon exoleta, TRYON. Am. Journ. Conch. III, 39, pl. vii, f. 8 (1867).

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From Western New York and Pennsylvania to Missouri; from Georgia to Illinois. Also in the postpleiocene of the Mississippi Valley

Fig. 247.

Jaw of *Helix exoleta.*

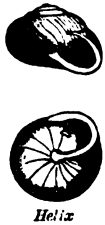
Jaw narrow, slightly arcuate, somewhat attenuated towards the ends; anterior surface ribbed; both margins denticulated.

The lingual membrane, as figured by Leidy (Terr. Moll. II, 200), is similar to that of *H. albolabris.*

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7920	5	.....	W. G. Binney.	.....
8603	2	.....	"	Cab. series.
8739	1	.....	W. Stimpson.	.....

Helix wheatleyi, BLAND.—Shell imperforate, depressed, conoid-globose, thin, reddish horn-colored, with numerous rib-like striæ, and microscopic granulations with very short hairs; spire shortly conoid; suture deeply impressed; whirls five and a half, rather convex, the last rounded, slightly depressed at the aperture, constricted; base convex, excavated in the umbilical region; aperture oblique, lunate, with a small parietal tooth-like tubercle; peristome acute, rose-colored, equally angularly reflected, appressed at the columella. Greater diam. 14, lesser 12; height 7 mill.

Fig. 248.



Helix wheatleyi.

Helix wheatleyi, BLAND, Ann. N. Y. Lyc. VII, 118, pl. iv, f. 19 (1860).

Mesodon wheatleyi, TRYON, Am. Journ. Conch. III, 40, pl. vii, f. 10 (1867).

Mountains in Cherokee County, North Carolina.

Helix dentifera, BINNEY.—Shell imperforate, flattened-convex on the upper surface, convex below; epidermis yellowish horn-color, immaculate; spire depressed; whirls five, with delicate, parallel, oblique striæ; suture distinct, not deeply impressed; aperture contracted by the peristome, flattened towards the plane of the base; peristome thickened, white, broadly and abruptly reflected; parietal wall with a prominent, white, tooth-like process nearly parallel with the lower margin of the aperture, not projecting towards the umbilicus; base convex. Greater diam. 23, lesser 18; height 10 mill.

Fig. 249.

Helix dentifera.

Helix dentifera, BINNEY, Bost. Journ. Nat. Hist. I, 494, pl. xxi (1840); Terr. Moll. II, 134, pl.

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xii.—ADAMS, Vermont Mollusca, 159 (1842).—PFEIFFER, Mon. Hel. Viv. I, 317.—W. G. BINNEY, Ter. Moll. IV, 55.—DEKAY, N. Y. Moll. 34, pl. ii, f. 17 (1843).—MRS. GRAY, Fig. of Moll. An. pl. cxci, f. 11, no descr. (from Bost. Journ.).—MORSE, Amer. Nat. I, 99, f. 6, 7 (1867). —Not of PFEIFFER, vol. III.—Not of CHEMNITZ, ed. 2 (= *roëmeri*).

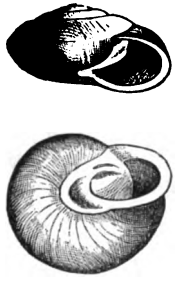
From Maine to Virginia and to Ohio. It prefers mountainous country.

Readily distinguished from the allied species by the very angular and broad reflection of the peristome.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8634	1	Pennsylvania.	W.G. Binney.	Cab. series.

Helix roëmeri, PFEIFFER. — Shell with a narrow, or partially covered umbilicus, sometimes imperforate, depressed, rather thin, closely striated, rather transparent and smooth, horn-colored; spire slightly elevated; suture lightly impressed; whirls five, rather convex, increasing slowly, the last one subcarinate at its periphery, scarcely descending; aperture lunar, oblique, generally slightly contracted by a parietal denticle which obliquely enters the mouth of the shell; peristome white, thickened, the upper portion hardly expanded, reflected below, and at the columellar junction spreading into a thin, partial covering to the umbilicus. Greater diam. 21, lesser 18; height 10 mill.

Fig. 250.



Helix roëmeri.

Helix roëmeri, PFEIFFER in Roëmer's Texas, 455 (1849); Zeitschr. f. Mal. 1848, 117.—REEVE, Con. Icon. no. 680. — W. G. BINNEY, Terr. Moll. IV, 55.

Helix dentifera, part, PFEIFFER, Mon. Hel. Viv. III, 269; in CHEMNITZ, ed. II, 331, pl. cxxxi, f. 1–3, not of BINNEY.

Mesodon roëmeri, TRYON, Am. Journ. Conch. III, 43, pl. viii, f. 4 (1867).

Near New Braunfels, Texas; Washington County and Colorado River, Texas.

This species is confounded by Pfeiffer with *H. dentifera*, an authentic specimen of which he has not seen. It is quite a distinct species, and inhabits a distinct geographical region. It may be distinguished from *dentifera* most readily by attention to the following particulars: Its umbilicus is generally but partially covered, while *dentifera* is always imperforate; its color is lighter,

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its surface smoother, and, above all, its lip is not so broadly reflected; it is also distinctly subcarinate at the periphery.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8740	2	Texas.	W. G. Binney.	Cab. series.

Helix thyroides, Say.—Shell narrowly umbilicated, depressed globose; spire convex; epidermis of a uniform yellowish-brown or russet color; whirls five, with fine, parallel striæ, running obliquely across them; spire more or less elevated; suture distinctly impressed; aperture lunate, contracted by the peristome, the plane of the aperture making a consider-

Fig. 251.

Helix thyroides.

able angle with the plane of the base of the shell; parietal wall with a prominent, white, tooth-like process placed obliquely to the axis of the shell; peristome white, thickened, widely reflected, and sometimes grooved on its face, its exterior yellowish; umbilicus exhibiting only one volution, partially covered by the reflected peristome where it unites with the base of the shell. Greater diam. 22, lesser 19½; height 13 mill.

Helix thyroides, Say, Nich. Encycl. (Amer. ed.), 1817. 1818, 1819; Journ. Phila. Acad. I, 123 (1817); American Conchology (1831), No. 2, pl. xiii; ed. Binney, 33, pl. xiii; ed. Chenu, Bibl. 3, 22, pl. iii, f. 3.—Eaton, Zool. Text-Book, 193 (1826).—Ferussac, Hist. pl. xlix, a, f. 4; pl. l, a, f. 6?—Deshayes, Encycl. Méth. II, 230 (1830); in Lam. An. sans Vert. VIII, 114; ed. 3, III, 309; in Fer. I, 209.—Binney, Bost. Journ. Nat. Hist. I, 488, pl. xviii (1837); Terr. Moll. II, 129, pl. xi.—Leidy, T. M. U. S. I, 257, pl. xi, f. 7–9 (1851), anat.—DeKay, N. Y. Moll. 29, pl. ii, f. 8.—Gould, Invertebrata, 171, f. 108 (1841).—Adams, Vermont Mollusca, 159 (1842).—Mrs. Gray, Fig. Moll. An. pl. ccxci, f. 6, from Bost. Journ., no descr.

Helix thyroides, Pfeiffer, Mon. Hel. Viv. I, 345; in Chemnitz, ed. 2, I, 331, pl. lviii, f. 8, 9 (1850).—Reeve, Con. Icon. no. 677.—W. G. Binney, Terr. Moll. IV, 53.—Morse, Amer. Nat. I, 98, f. 3 (1867).

Anchistoma thyroides, H. & A. Adams, Gen. pl. lxxviii, f. 3, no descr.

Mesodon thyroides, Tryon, Am. Journ. Conch. III, 41, pl. viii, f. 1 (1867).

From Canada through all eastern North America, and in the postpleiocene of the Mississippi Valley.

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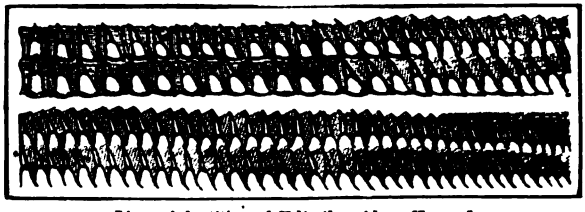
The specimens selected for figuring show the variation in size of the species. The smaller form (from near Philadelphia) is often found imperforate and toothless.

Jaw long, narrow, slightly arcuate, with thirteen stout ribs on both anterior and posterior surface, denticulating the cutting margin.

Teeth of the lingual membrane obtusely conical, surmounted by a long, sharp apex.

Fig. 252.



Lingual dentition of *Helix thyroides*. [LEIDY.]

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7942	5	St. Simon's Is., Ga.	Dr. J. Lewis.	Local var.
8007	2	Grand Rapids, Mich.	.....	.....
7994	4	.....	W. G. Binney.	.....
8008	1	Alabama.	.....	.....
8009	1	District of Columbia.	W. Stimpson.	.....
8010	1	Fort Bridger.	Lieut. Bryan.	.....
8025	1	Wisconsin.	I. A. Lapham.	.....
8026	4	Texas.	Lieut. Couch.	.....
8027	1	Mobile, Ala.	Hamilton.	.....
8617	3	.....	W. G. Binney.	Cab. series.

Helix bucculenta, GOULD.—Shell usually perforate, globose-conic, more or less elevated, rather thin, shining, pale yellowish-green, surface regularly and delicately furrowed by the striæ of growth; whirls five or a little more, rounded, and separated by a well-impressed suture; base convex; aperture rounded; peristome forming nearly two-thirds of a circle, rather broadly reflexed, white, somewhat flesh-colored behind, not completely covering a small umbilical perforation, sometimes entirely covering it; parietal wall sometimes bears a small white tooth at the middle, but oftener not. Greater diam. 18½, lesser 15½; height 10½ mill.

Fig. 253.

Helix bucculenta.

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Helix bucculenta, Gould, Proc. Bost. Soc. Nat. Hist. III, 40 (1848); Terr. Moll. III, 9, pl. xi, a.—Pfeiffer, Mon. Hel. Viv. III, 271; IV, 323.—W. G. Binney, Terr. Moll. IV, 54.

Helix thyroides, β, Pfeiffer, Mon. Hel. Viv. I, 345.—Var., Férussac, Hist. pl. l, a, f. 7.

Mesodon bucculenta, Tryon, Am. Journ. Conch. III, 41, pl. viii, f. 2 (1867).

Fig. 254.

From North Carolina to Texas.

Very nearly allied to, if not identical with *H. thyroides*.

Fig. 254 represents a smaller form of this variable species.

Helix bucculenta.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7933	3	S. W. States?	W. G. Binney.	Imperfor., toothed.
8592	4	Grand Coteau, La.	.....	Cab. series.
8739	3	Texas.	W. G. Binney.	"
8808	12	"	"	.....
8981		Western Texas.	.....	.....

Helix clausa, Say.—Shell subimperforate, conoidly-semiglobose, rather solid, with crowded, rib-like striæ, yellowish horn-color; spire subregularly conoid; whirls five and a half, rather convex, gradually increasing, the penultimate subangular, the last rounded, anteriorly subconstricted and briefly deflected; umbilicus narrow, almost covered by the reflected peristome; aperture diagonal, subregularly lunate; peristome with a heavy, white thickening, uniformly subangularly reflected, its columellar portion subdilated. Greater diam. 18½, lesser 16; height 11½ mill.

Fig. 255.

Helix clausa.

Helix clausa, Say, Journ. Phila. Acad. II, 154 (1821); American Conch. (1832), No. 4, pl. xxxvii, f. 1; Binney's ed. 17, pl. xxxvii, f. 1; ed. Chenu, Bibl. Conch. III, 50, pl. xiii, f. 2.—Binney, Bost. Journ. Nat. Hist. I, 482, pl. xv (1837); Terr. Moll. II, 107 (excl. syn.), pl. iv (excepting the outline figures).—DeKay, N. Y. Moll. 31, pl. iii, f. 13 (1843).—Reeve, Con. Icon. f. 694.—Bland, Ann. N. Y. Lyc. VI, 336.—Pfeiffer, Mon. Hel. Viv. IV, 321.—W. G. Binney, Terr. Moll. IV, 46.

Helix pennsylvanica, Pfeiffer, ex parte, Symb. ad. Hist. Hel. II, 36; Mon. Hel. Viv. I, 291; in Chemnitz, ed. 2, II, 51, ex parte.—Reeve, ex parte, Con. Icon. no. 676.

Helix mitchelliana, Pfeiffer in Chemnitz, *l. c.* I, 332, pl. lvi, f. 6–8.

Mesodon clausa, Tryon, Am. Journ. Conch. III, 47, pl. viii, f. 16 (1867).

In the States bordering on the Ohio River, and in Wisconsin,

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Missouri, Tennessee, Mississippi, and Alabama. It is also found in the postpleiocene beds of the Mississippi Valley.

In *H. clausa* the umbilical region is more widely excavated, and the groove, behind the reflected peristome, producing the contraction of the aperture, is continued at the base of the shell, becoming wider as it joins the umbilical opening. In *H. mitchelliana* the groove is almost obliterated at the point of reflection of the peristome over the umbilicus, by the more tumid character of the last whirl.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7916	1	Mobile, Ala.	Hamilton.	.....
7918	1	.....	.....	Deformed.
7919	2	Alabama.	.....	.....
8604	4	"	W. G. Binney.	Cab. series.

Helix columbiana, LEA. — Shell umbilicated, subdepressed-globose; epidermis with short, rigid hairs, corneous, thin; whirls six, slightly rounded, very minutely striated, rising gradually, but regularly, one above the other to an acuminated apex; suture strongly impressed; aperture roundly lunate, a little contracted and thickened, by a testaceous deposit or border, at the angle of reflection of the peristome; peristome thickened, whitish, or brownish-white, reflected but not flattened, rather grooved on its face, the basal margin horizontal in its direction, with a slight thickening or projection before it reaches the base of the shell; umbilicus open, partially hidden by the reflected peristome at its junction with the base; base a little flattened. Greater diam. 17, lesser 14; height 11 mill.

Fig. 256.

Helix columbiana.

Helix columbiana, LEA, Am. Phil. Soc. Trans. VI, 89, pl. xxiii, f. 75; Obs. II, 89 (1839); in TROSCHEL, Arch. f. Nat. 1839, II, 221.—DEKAY, N. Y. Moll. 46 (1843).—PFEIFFER, Mon. Hel. Viv. I, 343; in CHEMNITZ, ed. 2, I, 332, pl. lviii, f. 10–12 (1846).—REEVE, Con. Icon. no. 692 (1852).—BINNEY, Terr. Moll. II, 169, pl. v.—W. G. BINNEY, Terr. Moll. IV, 16.

Helix labiosa, GOULD, Proc. Bost. Soc. Nat. Hist. II, 165 (1846); U. S. Expl. Exped. Moll. 67, f. 35 (1852); Terr. Moll. II, 170, pl. xiii, a, f. 1.—PFEIFFER, Mon. Hel. Viv. I, 343.

Mesodon columbiana, TRYON, Am. Journ. Conch. III, 46, pl. viii, f. 12–14 (1867).

A west coast species, from Sitka and Ft. Simpson (lat. 54° 40′) to Santa Cruz in California (lat. 37° 20′) (*Newcomb*).

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Mr. Bland has a specimen with a well-developed parietal tooth.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8342	6	Fort George.	Com. Wilkes.	.....
8344	1	.....	.....	.....
8343	4	Astoria.	Com. Wilkes.	.....
8345	2	Oregon City.	.....	.....
8337	1	Columbia River.	.....	Cab. series.

Helix downieana, Bland.—Shell umbilicate, umbilicus nearly covered, subglobose, thin, subpellucid, with obsolete rib-like striæ, decussated with crowded microscopic spiral lines, greenish horn-colored; spire short, obtuse; whirls five, convex, the last tumid, anteriorly somewhat gibbous, scarcely descending, constricted; aperture oblique, lunate oval; peristome white, labiate, reflected, right margin expanded, columellar margin angularly dilated, nearly covering the umbilicus. Greater diam. 10½, lesser 9½; height 6 mill.

Fig. 257.

Helix downieana.

Helix downieana, Bland, Ann. N. Y. Lyc. VII, 420, pl. iv, f. 23, 24 (1861).

Mesodon downieana, Tryon, Am. Journ. Conch. III, 47, pl. viii, f. 15 (1867).

University Place, Franklin County, Tennessee.

Helix jejuna, Say.—Shell umbilicated, subglobose; epidermis corneous, nearly smooth; spire rather prominent; suture impressed; whirls rather more than five, the last ample; striæ of increase hardly visible; peristome white, very narrow, reflected, a deep groove behind it; aperture well rounded, semicircular, considerably contracted by the impressed groove behind the peristome, and a corresponding testaceous deposit, or rib, within; umbilicus small, round, not expanded; umbilical region not impressed; base convex. Greater diam. 8, lesser 7; height 4½ mill.

Fig. 258.

Helix jejuna.

Helix jejuna, Say, Journ. Phila. Acad. II, 158 (1821); Binney's ed. 9.—DeKay, N. Y. Moll. 46.—Pfeiffer, Mon. Hel. Viv. I, 147.—Bland, Ann. N. Y. Lyc. VI, 341 (1858).—W. G. Binney, Terr. Moll. IV, 67.

Helix mobiliana, Lea, Proc. Am. Phil. Soc. II, 82 (1841); Trans. Am. Phil. Soc. IX, 17; Obs. IV, 17 (1844); in Troschel, Arch. f. Nat. 1843, II, 124.—Pfeiffer, Mon. Hel. Viv. I, 323; IV, 122.—Binney, Terr. Moll. II, 172, pl. xlii, f. 2.

Hygromia jejuna, Tryon, Am. Journ. Conch. II, 308, pl. v, f. 3 (1866).

Georgia, Florida, Alabama.

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Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
6742	1	Georgia.	W. G. Binney.	Cab. series.

Helix devia, GOULD.—Shell umbilicated, solid, depressed globose, pale yellowish horn-color, or brown, with fine lines of growth; whirls six, convex, suture well defined; beneath slightly convex, and perforated by a moderate-sized umbilicus, which appears to have an obtuse channel revolving on the whirls within it; periphery rounded; aperture transverse, obliquely lunate; peristome thickened, white, or sometimes rufous, rather broadly reflected, horizontal at base, the inner edge dilated into an elongated, lamellar, white, tooth-like process, and abruptly turning up to form a short columella, where it dilates, and partly surrounds the umbilicus; near the upper margin, and on the parietal wall, is a white trigonal tooth. Greater diam. 24, lesser 19; height 14 mill.

Fig. 259.

Helix devia.

Helix devia, GOULD, Proc. Bost. Soc. Nat. Hist. II, 165 (1846); Terr. Moll. III, 11; Moll. of Expl. Exped. 69, f. 74, Addenda, *501 (1852).—PFEIFFER, Mon. Hel. Viv. I, 383.—W. G. BINNEY, Terr. Moll. IV, 17, pl. lxxix, f. 13.

Helix baskervillei, PFEIFFER, Proc. Zool. Soc. 1849; Mon. Hel. Viv. III, 230.—REEVE, Con. Icon. f. 684.

Mesodon devia, TRYON, Am. Journ. Conch. III, 42, pl. viii, f. 3 (1867).

Oregon; Washington Territory.

Helix profunda, SAY.—Shell broadly umbilicated, orbicularly depressed; epidermis yellowish horn-color, with reddish-brown, revolving lines and bands, sometimes uniformly brown or albino; whirls from five to six, convex, obliquely striated with delicate and regular raised striæ; suture distinct; aperture almost circular, a little contracted by the peristome, flattened towards the plane of the base; peristome white, thickened, reflected, with a slightly prominent callus, or obtuse tooth, on the inner edge near the base; umbilicus rather large and profound, exhibiting all the volutions to the apex; base convex, with the striæ converging into the umbilicus. Greater diam. 29, lesser 24; height 14 mill.

Fig. 260.

Helix profunda.

Helix profunda, SAY, Journ. Phila. Acad. II, 160 (1821); American Conchology, No. 4, pl. xxxvii, f. 3; ed. BINNEY, 20, 36, pl. xxxvii, f. 3; ed. CHENU, III, 51, pl. xiii, f. 2, b, 2, c.—DEKAY, N. Y. Moll. 42, pl. iii, f. 3.—LEIDY, T. M. U. S. I, 255, pl. ix, f. 1–3, anat.—BINNEY, Bost. Journ. Nat. Hist. III, 377, pl. xv; Terr. Moll. II, 177.

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pl. xxii.—Pfeiffer, Mon. Hel. Viv. I, 382; in Chemnitz, ed. 2, II, 63, pl. lxxvii, f. 14–16.—Deshayes in Fer. I, 69.—Mrs. Gray, Fig. Moll. An. pl. cxciii, f. 12.—Reeve, Con. Icon. 682.—W. G. Binney, Terr. Moll. IV, 70.

Helix richardi, Ferussac, Tab. Syst. 43; Hist. pl. lxx, three lower figs. —Lamarck, An. s. Vert. VI, 72.—Deshayes, Encycl. Méth. II, 212; in Lam. VIII, 40; ed. 3, III, 283.—Chenu, Ill. Conch. pl. xii, f. 13. —Delessert, Rec. des Coq. pl. xxvi, f. 7.

Junior? *Helix bulbina*, Deshayes in Fer. Hist. I, 108, pl. lxxxv, f. 14–18. —Pfeiffer, Mon. Hel. Viv. III, 201.—W. G. Binney, Terr. Moll. IV, 116, pl. lxxix, f. 10.

Ulostoma profunda, Tryon, Am. Journ. Conch. III, 37, pl. vii, f. 3, (1867).

Western New York to Wisconsin, Virginia to Kansas. Also in the postpleiocene of the Mississippi Valley.

Fig. 261.

Jaw of *Helix profunda*.

Jaw arcuate, of uniform width, ends blunt; anterior surface crowded with stout ribs, denticulating either margin.

Lingual membrane with 142 rows of 40—1—40 teeth; centrals with a large, stout, obtusely pointed median and two obsolete side-cusps; laterals of same shape, but bicuspid; uncini with irregular, long denticles.

Fig. 262.

Lingual dentition of *Helix profunda*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7946	3	Strontian Isl., L. Erie.	W. G. Binney.	Local var.
7949	2	Kansas, n. St Josephs.	.....	.....
7950	1	Milwaukee, Wis.	I. A. Lapham.	.....
7951	2	Illinois.	.....	.....
8581	2	.....	W. G. Binney.	Cab. series.
8582	2	.....	"	"

Helix sayii, Binney.[1]—Shell umbilicated, orbicularly-depressed, thin; epidermis light russet, shining; whirls between five and six, with

[1] The name *H. sayii* is preoccupied, but Wood gives no description, and even if he did, I should not reject the well-established use of the name for this species. (See p. 89.)

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numerous fine, oblique striæ; suture impressed; aperture lunately-subcircular, not dilated; peristome white, narrow, thickened, reflected, with a slightly projecting tooth on the inner edge of the basal portion near the umbilicus; parietal wall with a sub prominent, white tooth; umbilicus open, deep, not wide, exhibiting all the volutions, slightly contracted by the reflected peristome; base rounded, with the striæ distinct, converging into the umbilicus. Greater diam. 27, lesser 23; height 17 mill.

Fig. 263.

Helix sayii.

Helix diodonta, Say, Long's Exped. II, 257, pl. xv, f. 4 (1824); ed. Binney, 39, pl. lxxiv, f. 4.—DeKay, N. Y. Moll. 34, pl. ii, f. 18.—Deshayes in Fer. pl. lxix, i, f. 2.

Helix sayi, Binney, Bost. Journ. Nat. Hist. III, 379, pl. xvi (1840); Terr. Moll. II, 180, pl. xxiii.—Adams, Vermont Mollusca, 160 (1842).—W. G. Binney, Terr. Moll. IV, 70.—Pfeiffer, Mon. Hel. Viv. I, 382; in Chemnitz, ed. 2, III, 419, tab. cxlviii, f. 13, 14.—Leidy, T. M. U. S. I, 256, pl. xi, f. 1–4 (1851), anat.—Mrs. Gray, Fig. Moll. An. pl. cxciii, f. 10, from Bost. Journ., no descr.—Deshayes in Fer. I, 79.—Reeve, Con. Icon. no. 679 (1852).—Morse, Amer. Nat I, 98, f. 4, 5 (1867).

Mesodon sayii, Morse, Journ. Portl. Soc. I, 9, f. 9, pl. iv, f. 10 (1864).

Ulostoma sayii, Tryon, Am. Journ. Conch. III, 38, pl. viii, f. 4 (1867).

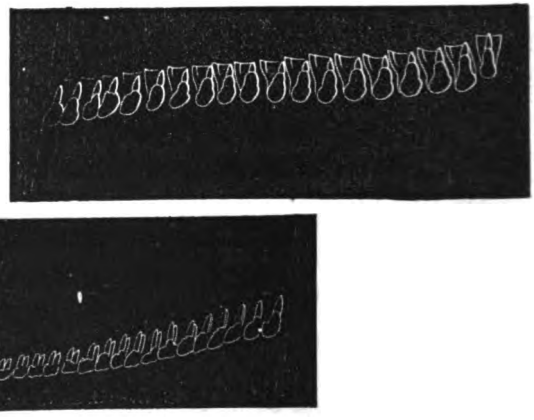
Fig. 264.

Jaw of *Helix sayii.* [Morse.]

From Canada East to Michigan and Maryland.

Jaw arcuate, ends somewhat attenuated, blunt; anterior surface with numerous stout ribs, denticulating either margin.

Fig. 265.



Lingual dentition of *Helix sayii.* [Morse.]

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Lingual membrane with 123 rows of 42—1—42 teeth each; centrals long, narrow, with a long, acutely-pointed apex; laterals of same shape as centrals; first uncini short, with two long, coalescing denticles; extreme uncini with three short, obtuse denticles.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8034	1	Fleming, Centre Co., Pa.	.....	.....
8628	1	.....	W. G. Binney.	Cab. series.
9190	1	Vermont.	W. Stimpson.	.....

Subgenus **ACANTHINULA**, Beck.

Shell perforated, globosely turbinated, with a brownish plicately-ribbed or aculeate epidermis; whirls 4–5; aperture rounded; peristome thin, somewhat expanded, its terminations approached.

Animal (of *H. harpa*) small, compared to the size of the shell; body and head slate color, eye-peduncles darker, short, thick; bulbous; eyes large, distinct; foot but two-thirds length of shell, whitish; the body, disk, and mantle are marked with white dots, the edge of the mantle is of the same color as the head and eye-peduncles. The disk is rounded posteriorly, and broad and truncated anteriorly, the lateral borders are deeply crenulated. The head is separate from the disk as in the *Pupinæ*, bearing two minutely crenulated lappets, which hang down on either side of the mouth like a visor, reminding one of the oblique folds on the head of *Glandina truncata*, which we believe to be homologous to them. A longitudinal furrow extends from the mouth downward. The body is so translucent that when extended the ganglionic centres can be plainly seen. In motion they are exceedingly graceful, at times poising their beautiful shell high above their body, and twirling it around, not unlike the *Physa*, again hugging their pretty harp close to their body; the shell, when in this last position, continually oscillates as if the animal could not balance it; it

Fig. 266.

Animal of *Helix harpa*.

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rarely ever moves in a straight line, but is always turning and whisking about, and this is done at times very quickly and abruptly. (*Morse.*)

Helix (?) harpa, SAY.—Shell subperforate, ovately-conic, transparent, very thin, with coarse, irregular lines of growth, pellucid, light horn-color; spire conical, rather obtuse; whirls four, convex, the upper ones smooth, the two last with prominent, distant, thin, colorless fold-like ribs, slightly inclined backwards, the last whirl rounded, somewhat longer than the spire; columella subreceding; aperture lunately oval; peristome simple, straight, its columellar termination briefly reflected above. Greater diam. 2 mill.; length 3½; aperture 1¾ long, 1¼ mill. wide.

Fig. 267.

Helix harpa, enlarged.

Helix harpa, SAY, Long's Exped. II, 256, pl. xv, f. 1 (1824); BINNEY's ed. 29, pl. lxxiv, f. 1.

Pupa costulata, MIGHELS, Proc. Bost. Soc. Nat. Hist. I, 187 (1844).

Bulimus harpa, PFEIFFER, Zeitschr. f. Malak. 1847, 147; Mon. Hel. Viv. II, 150; in CHEMNITZ, ed. 2, no. 305, pl. lx. f. 17–19.—REEVE, Con. Icon. no. 536 (1849).—BINNEY, Terr. Moll. II, 290, pl. lii, f. 3.—W. G. BINNEY, Terr. Moll. IV, 135.

Zoögenites harpa, MORSE, Journ. Portl. Soc. I, 32, pl. i, f. 1–14 (1864); Amer. Nat. I, 608, f. 50, 51 (1868).

Helix amurensis, GERSTF., teste MÖRCH.

Gaspé; Maine; New Hampshire. Originally found by Say on the Expedition to St. Peter's River, &c. British America, English River, and James' Bay (*Phil. Proc.* 1861); Sweden (*Mal. Blätt.* 1867, p. 200); Norway, Lapland, &c.

Fig. 268.

Jaw of *Helix harpa*.

Jaw strongly arcuate, of uniform width throughout, ends blunt; anterior surface costate; concave margin indented, with a blunt median projection. Lingual membrane with 20 rows of 17—1—17 teeth; centrals

Fig. 269.

Lingual dentition of *Helix harpa*.

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tricuspid, median cusp long and slender; laterals same shape, but bicuspid; uncini wide, short, serrated.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8712	2	Maine.	W. G. Binney.	Cab. series.
9086	1	English River.	R. Kennicott.	.....
9088	1	James' Bay.	Drexler.	.....

SUBGENUS **VALLONIA**, Risso.

Shell umbilicated, depressed, diaphanous, whirls 3½–4; aperture oblique, subcircular; peristome white, thickened, reflected, its margins contiguous or converging.

Helix pulchella, MÜLL.—Shell widely umbilicated, depressed, slightly convex above, thin and transparent; epidermis colorless; whirls four, very minutely striated, the last large, and spreading at the aperture like a trumpet; aperture orbicular, a little dilated; peristome much thickened, white, reflected, making nearly a continuous circle, ends approaching; umbilicus large, exhibiting all the volutions. Greater diam. 3, lesser 2½; height 1½ mill.

Fig. 270.

Helix pulchella, enlarged.

Helix pulchella, MÜLLER, Verm. 30.—PFEIFFER, Mon. Hel. Viv. I, 365.—BINNEY, Bost. Journ. Nat. Hist. III, 375, pl. ix, f. 2 (1840); Terr. Moll. II, 175, pl. xvii, f. 1.—LEIDY, T. M. U. S. I, 256, pl. ix, f. 7–9 (1851), anat.—GOULD, Invertebrata, 176, f. 102 (1841).—ADAMS, Vermont Mollusca, 159 (1842).

Helix minuta, SAY, Journ. Phila. Acad. I, 123 (1817); Nich. Encycl. ed. 3 (1819); BINNEY's ed. 3.—DEKAY, N. Y. Moll. 40, pl. iii, f. 33 (1843).—MORSE, Amer. Nat. I, 544, f. 39 (1867).

Helix costata, MÜLLER, *vid.* PFEIFFER, Mon. Hel. Viv. I, 366.

Vallonia minuta, MORSE, Journ. Portl. Soc. I, 21, f. 54–56, pl. viii, f. 57 (1864).—TRYON, Am. Journ. Conch. III, 36, pl. vii, f. 26 (1867).

From Canada East to Nebraska and Florida. Also throughout Europe, Siberia, Thibet, Madeira, Azores, &c.

The strongly ribbed variety (*H. costata*) has been found in large numbers in Kansas, and at Cincinnati and Philadelphia.

Fig. 271.

Jaw of *Helix pulchella*. [MORSE.]

Jaw long, narrow, slightly bent at the ends, straight in the centre, of uniform width throughout; ends

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blunt; anterior surface with vertical ribs; concave margin minutely notched.

Lingual membrane with 75 rows of 11—1—11 teeth each;

Fig. 272.

Lingual dentition of *Helix pulchella*. [MORSE.]

centrals very small, broad, obtuse, tricuspid; laterals long, bicuspid; uncini short, broad, serrated.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7912	38	Kansas.	.....	.....
7913	1	Apple Creek.	.....	.....
7914	14	Halifax N. S.	.....	.....
7937	2	Marietta, Ohio.	W. Holden.	.....
8587	100	New York.	Dr. J. Lewis.	Cab. series.
8588	100	Kansas.	.....	"
8583	100	Massachusetts.	W. Stimpson.	.....

SUBGENUS **FRUTICICOLA**, Held.

Shell umbilicated or perforated; depressed-globose, sometimes pilose; whirls 5–7, rather convex; aperture broadly lunate or lunate-rounded, peristome acute, very briefly expanded, labiate within, its basal margin reflexed.

Helix hispida, LINN.—Shell openly umbilicated, suborbiculately-depressed, horn-color, shining, with short hairs; spire convex; whirls five to six, rather convex, narrow; aperture broadly lunate; peristome spreading, thickened with white within, its basal terminus more narrow, prominent, and acute. Greater diam. 10, lesser 9; height 5½ mill.

Fig. 273.

Helix hispida.

Helix hispida, LINNÆUS, Syst. 675, &c. &c.—PFEIFFER, Mon. Hel. Viv. I, 148.

Hygromia hispida, TRYON, Am. Journ. Conch. II, 308, pl. v, f. 2 (1866).

This is an European species, which has been found at Halifax, N. S., probably accidentally introduced from England.

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Moquin-Tandon figures the jaw of a French specimen as slightly arcuate; ends rounded, somewhat attenuated; anterior surface with numerous ribs, denticulating the concave margin.

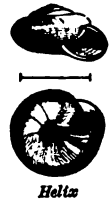
Fig. 274.

Jaw of *Helix hispida.*

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7944	42	Halifax, N. S.	.....	Introd. from Europe.
8587	6	" "	.....	Cab. series. Introd.
9188	20	Nova Scotia.	.....	[from Europe.

Helix rufescens, PENNANT.—Shell umbilicated, subglobose-depressed, subcarinate, striate, pale reddish; spire moderately elevated; whirls six, rather convex, the last banded with white, not deflected anteriorly; aperture ovate-lunar; peristome spreading, thickened with white at some distance within, the columellar margin somewhat reflected. Greater diam. 11, lesser 10, height 6 mill.

Fig. 275.



Helix rufescens.

Helix rufescens, PENNANT, &c. &c.—PFEIFFER, Mon. Hel. Viv. I, 141.

Hygromia rufescens, TRYON, Am. Journ. Conch. II, 301, pl. v, f. 1 (1866).

Germany, England, and other European countries. Also found at Quebec, probably introduced from England.

Helix berlandieriana, MORICAND.—Shell perforated, globose, thin and translucid, scarcely striated, shining, and with a somewhat silken or opaline lustre, pale yellowish-green, sometimes nearly colorless and generally having a faint, narrow, brownish band around the posterior third of the last whirl; spire consisting of five well rounded whirls, separated by a deeply impressed suture, the last whirl broadly rounded at the periphery; contracted at the aperture, which is small, crescentic, with a white, polished, roundly reflexed peristome, presenting a sharp, inner edge to the interior; the peristome is somewhat angular near its posterior junction, and at this part the shell is thickened within with callus, and is opaque white; base rounded, and perforated by a minute umbilicus. Greater diam. 13, lesser 10; height 8 mill.

Fig. 276.

Helix berlandieriana.

Helix berlandieriana, MORICAND, Mém. de S. Phys. et d'Hist. Nat. de Genève, VI, 537, pl. i, f. 1 (1833).—DESHAYES in LAM. An. sans Vert. VIII, 133; ed. 3, III, 316.—LEIDY, T. M. U. S. I, 255, pl. viii, f. 11 (1851), anat.—BINNEY, Terr. Moll. II, 109, pl. xlix, f. 1.—W. G. BINNEY, Terr. Moll. IV, pl. lxxvii, f. 22.—

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Pfeiffer, Mon. Hel. Viv. III, 227 (not I); in Chemnitz, ed. 2, II, 275, pl. cxxiii, f. 15–18.—Reeve, Con. Icon. no. 708 (1852).

Helix pachyloma, Menke in Pfeiffer, *l. c.* I, 323; Zeitschr. f. Mal. 1847, IV, 32.

Helix virginalis, Pfeiffer, Mon. Hel. Viv. III, 132; I, 165 as *berlanderiana*; IV, 140; in Chemnitz, ed. 2, I, 260, pl. xxxviii, f. 18, 19.

Hygromia berlandieriana, Tryon, Am. Journ. Conch. II, 309, pl. v, f. 4 (1867).

Arkansas, Texas, and the neighboring portions of Mexico.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8000	6	Tamaulipas, Mex.	Lieut. Couch.	.....
8001	1	Texas.	G. Wurdemann.	.....
8002	1	"	.....	= *H. virginalis?*
8660	3	Indianola, Tex.	Lieut. Couch?	Cab. series.
9164	1	Chapatilo, Mex.	.....	.....

Helix griseola, Pfr.—Shell umbilicated, depressed-globose, obliquely striate, shining, grayish, banded with red, white-margined stripes; spire short; whirls four to four and a half, rather convex; umbilicus very narrow; aperture lunar; peristome simple, white, reflected somewhat, its columellar end rather expanded. Greater diam. 10, lesser 8⅔; height 6 mill.

Fig. 277.

Helix griseola.

Helix griseola, Pfeiffer, Symb. Hist. Hel. I, 41; Mon. Hel. Viv. I, 337; in Chemnitz, ed. 2, I, 342, pl. lx, f. 17, 18.—Reeve, Con. Icon. no. 327 (1852).—W. G. Binney, Terr. Moll. IV, 50, pl. lxxvii, f. 20.

Helix cicercula, Ferussac in Mus., teste Pfeiffer.

Helix splendidula, Anton, Verz. 36, no descr., teste Pfeiffer.

Helix albocincta, Binney, Terr. Moll. I, 128.

Helix albozonata, Binney in tab. xlix, f. 2.

Helix berlandieriana, Gould, part, in Terr. Moll. II, 109.

Helix albolineata, Gould, Terr. Moll. III, 34.

Hygromia griseola, Tryon, Am. Journ. Conch. II, 309, pl. v, f. 5 (1867).

Texas to Vera Cruz, Mexico.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7941	2	Tamaulipas, M.	Lieut. Couch.	.....
8047	3	Texas.	"	.....
8580	2	"	"	Cab. series.

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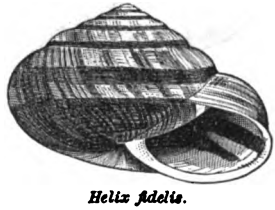
SUBGENUS **AGLAIA**, Albers.

Shell umbilicate, orbicularly convex, striatulate, banded; whirls $4\frac{1}{2}$–6, the last deeply deflexed in front; aperture lunate-ovate, very oblique; peristome thickened, expansively reflexed, white, its margins approaching, that of the columella dilated, reflexed, free, partially covering the umbilicus.

Animal (of *H. fidelis*): color dull ochre, slaty towards the tail; coarsely granular upon the neck; but from a line running from the dorsal line, where it issues from the shell, to the mouth, the granules diminish, and are succeeded by coarse, undulating, interrupted ridges, radiating in every direction from the aperture, and terminating in a line nearly marginal; edge simple.

Helix fidelis, GRAY.—Shell umbilicated, orbicularly subconoid; epidermis light yellow or brownish on the upper surface, with a black or chestnut colored, revolving band visible on the four outer whirls, the lower surface dark chestnut, sometimes uniformly black; suture distinct, impressed; whirls seven, rounded, spirally striate, with minute, delicate, impressed lines, the striæ of increase very distinct; peristome reflected below, simple above, thickened; aperture ovate, banded within; umbilicus open, a little contracted by the reflection of the peristome; base flattened-convex. Greater diam. 34, lesser 30; height 20 mill.

Fig. 278.



Helix fidelis.

Helix fidelis, GRAY, Proc. Zool. Soc. July, 1834, 67.—PFEIFFER, Mon. Hel. Viv. I, 338; in CHEMNITZ, ed. 2, I, 321, pl. lvii, f. 12–13.—MULLER, Syn. Test. anno 1834 promulg., 8 (1836).—REEVE, Con. Icon. no. 657 (1852).—W. G. BINNEY, Pac. R. R. Rep. VI, 111 (1857); Terr. Moll. IV, 14.

Helix nuttalliana, LEA, Am. Phil. Trans. VI, 88, pl. xxiii, f. 74; Obs. II, 88 (1839); TROSCHEL, Arch. f. Nat. 1839, II, 229.—BINNEY, Bost. Journ. Nat. Hist. III, 369, pl. xii (1840); Terr. Moll. II, 159, pl. xviii.—DEKAY, N. Y. Moll. 46 (1843).—GOULD, U. S. Expl. Exped. Moll. 66, f. 38 (1852).

Aglaja fidelis, TRYON, Am. Journ. Conch. II, 311, pl. v, f. 8 (1866).

Humboldt Bay, Cal., to Vancouver's Island, Oregon. From Mt. Shasta the specimens are half as large as usual.

11 October, 1868.

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Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8329	2	Puget Sound.	Com. Wilkes.	.....
8330	12	Columbia River. [Isl.	"	.....
8331	1	Equimalt Harb., Vanc.	.....	.....
8332	2	Umpqua Valley, Or.	.....	.....
8333	3	Fort Stillicon.	.....	.....
8334	3	Puget Sound.	Com. Wilkes.	.....
8335	1	Nisqually, Puget Sd.	.....	.....
8336	2	Straits of Fuca, W. T.	.....	.....
8337	1	.....	Com. Wilkes.	.....
8338	3	Puget Sound.	G. Gibbs.	.....
8339	2	Oregon City.	Dr. B. F. Shumard.	.....
8340	3	San Francisco.	.....	.....
8341	3	Fort Stillicon.	.....	.....
8454	2	Puget Sound.	Com. Wilkes.	In alcohol.
8455	2	Chilowaypuck, W. T.	A. Campbell.	"
4710	5	Puget Sound.	"	"
8457	4	" "	.....	"
8458	4	.....	A. Campbell.	"
8547	4	Columbia River.	.....	Cab. series.

Helix infumata, GOULD.[1]—Shell umbilicated, large, discoidal, biconvex, obtusely carinated at the periphery, widely umbilicated, smoky above, roughened with minute, oblique, rasp-like irregularities, below very black, shining and minutely granulated; whirls six and a half, convex; aperture rhomboidal; peristome reddish, somewhat reflected at base; throat silky-lilac, near the peristome smoky. Diam. 37, height 20 mill.

Fig. 279.

Helix infumata.

Helix infumata, GOULD, Proc. Bost. Soc. V, 127 (1855); Terr. Moll. III, 13.—W. G. BINNEY, Pac. R. R. Rep. VI, 112 (1857); Terr. Moll. IV, 15, pl. lxxix, f. 2.—PFEIFFER, Mon. Hel. Viv. IV, 351.

Aglaja infumata, TRYON, Am. Journ. Conch. II, 310, pl. v, f. 6 (1867).

Fig. 280.

Jaw of *Helix infumata.*

California, from Humboldt's Bay to San Pablo Bay.

Jaw very arcuate, of uniform width throughout; ends square; anterior surface with crowded, stout ribs, denticulating either margin.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8328	1	California.	Dr. J. S. Newberry.	.....
8558	1	San Francisco.	Dr. Bigelow.	Type. Cab. series.

[1] The last whirl is covered with very short, thickly-studded soft hairs. (*Newcomb.*)

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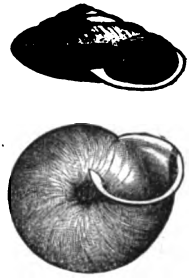
Helix hillebrandi, Newcomb.—Shell umbilicated, biconvex, orbicularly depressed, carinated; yellowish horn-color, with a chestnut band within two white ones, showing only in the aperture, granulated, finely striate and hirsute; spire subpyramidal; whirls six, slightly convex, the last carinated at its middle, inflated below, slightly descending; aperture oblique, lunate, subangulate, white and banded within; peristome white, thickened, reflected, partially concealing the open umbilicus, ends approached. Greater diam. 25, lesser 19; height 10 mill.

Fig. 281.



Helix hillebrandi.

Helix hillebrandi, Newcomb, Proc. Cal. Acad. Nat. Sci. III, 115, 181 (1864).

Aglaja hillebrandi, Tryon, Am. Journ. Conch. II, 310, pl. v, f. 7 (1866).

Tulumne Co., California.

The specimen figured is from Dr. Newcomb.

Subgenus **ARIONTA**, Leach.

Shell umbilicately-perforate, conic- or depressed-globose, thin; whirls 5–6, the last gradually descending; aperture lunate-rotund; peristome broadly labiate, its margins parallel, the basal dilated, often covering the umbilicus.

Animal (of *H. townsendiana*) corpulent, gradually tapering; color pale yellowish-green; surface with rather sparse, feebly-developed, elliptical granules, not seeming to have any regular arrangement; margin of disk rather broad, granulated, but regularly marked with radiating furrows.

Helix arrosa, Gould.—Shell globose conic, thick, umbilicated, indented, and minutely granulated; color reddish-olive, varied with yellow, and with a fuscous revolving band; whirls seven, convex; aperture roundly ovate; peristome reflected, flesh-colored; throat bluish. Diam. 40, height 18 mill.

Fig. 282.

Helix arrosa.

Helix æruginosa, Gould, Proc. Bost. Soc. V, 127 (1855); Terr. Moll. III, 12.—W. G. Binney, Pac. R. R. Rep. VI, 113 (1857).

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Helix arrosa, GOULD, in litt.; Otia, 215.—W. G. BINNEY, Proc. Acad. Nat. Sci. Philad. 1857, 185; Terr. Moll. IV, 15, pl. lxxvi, f. 4.—PFEIFFER, Mon. Hel. Viv. IV, 350.

Aglaja arrosa, TRYON, Am. Journ. Conch. II, 311, pl. v, f. 10 (1867).

Fig. 283.

Jaw of *Helix arrosa*.

California; Santa Cruz to Mendocino County (*Cooper*).

Jaw arcuate, of uniform breadth throughout; ends blunt; anterior surface with a few (six) rather distant, stout ribs crenulating both margins.

Lingual membrane with 180 rows of 54—1—54 teeth each;

Fig. 284.

Lingual dentition of *Helix arrosa*.

centrals long, conical, with a conical apex, laterals of same shape; uncini large, irregularly denticulated or obtusely serrated.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8348	1	California.	.....	.....
8349	1	Columbia River.	.....	.....
8555	1	San Francisco.	.....	Cab. series.
8556	1	" "	.....	Var. β. Cab. series.
9246	2	Petaluma.	Dr. Newberry.	.....
9247	3	"	"	.....
9324	20	Near San Francisco.	Rev. J. Rowell.	.....

Helix townsendiana, LEA.—Shell umbilicated, depressed-globose; epidermis yellowish and brownish horn-color, more or less intermixed; suture distinct; whirls five and a half, with minute, impressed, longitudinal striæ, which can scarcely be traced by the eye, and coarse, oblique wrinkles and striæ; body-whirl large, voluminous, rough, and corrugated; aperture rather large, somewhat rounded; peristome white, fully reflected at the base, and but partially so towards its superior part, thickened and a little projecting internally in the base of the aperture; umbilicus open, deep, a little contracted by the reflection

Fig. 285.

Helix townsendiana.

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of the peristome; base convex and turgid. Greater diam. 29, lesser 24; height 16 mill.

Helix townsendiana, Lea, Trans. Am. Phil. Soc. VI, 99, pl. xxiii, f. 80 (1840); Obs. II, 99 (1839); in Troschel's Arch. f. Nat. 1839, II, 221.—Binney, Bost. Journ. Nat. Hist. III, 371, pl. xiii; Terr. Moll. II, 161, pl. xix.—DeKay, N. Y. Moll. 46 (1843).—Pfeiffer, Mon. Hel. Viv. I, 341; in Chemnitz, ed. 2, I, 323, pl. lvii, f. 10, 11 (1846).—Reeve, Con. Icon. 625 (1852).—Gould, U. S. Expl. Exp. Moll. 66, f. 36 (1852).—W. G. Binney, Terr. Moll. IV, 15.—Bland, Ann. N. Y. Lyc. VII, 362.

Mesodon townsendiana, Tryon, Am. Journ. Conch. III, 46, pl. viii, f. 7 (1867).

Helix pedestris, Gould formerly, see Otia, 243.

Helix ruida, Gould formerly.

Washington Territory; Crescent City, California; Montana (*Cooper*).

A small variety (17 mill. diam.) is found, more strongly and coarsely wrinkled.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8359	4	Nisqually, Puget Sound.	.....	Albino.
8360	1	Chiloncyuck Dep., Puget	A. Campbell.	.....
8361	5	Puget Sound.	.....	.....
8362	1	" "	.....	Albino.
8363	1	De Fuca.	.....	.....
8364	1	Puget Sound.	Com. Wilkes.	.....
8365	18	Oregon?	"	.....
4290	9	Columbia River.	"	Alcoholic.
8456	2	Chiloncyuck, W. T.	N. W. Bound. Surv.	"
8544	2	Puget Sound.	A. Campbell	Cab. series.
8545	1	" "	Dr. C. B. Kennerly.	"
9318	4	E. of Ft. Colville, W. T.	N. W. Bound. Surv.	.....

Helix tudiculata, Binney.—Shell subumbilicated, orbiculate-convex; epidermis olivaceous; spire a depressed cone; whirls between five and six, slightly convex; body-whirl voluminous, expanding somewhat towards the aperture; aperture transverse, rather circular; peristome whitish, thin, expanded, slightly reflected at the basal portion, at the columella dilated, reflected, and almost closing the umbilicus; base convex; a well-defined, rather wide, dark chestnut band, margined with a light color above and below, revolves near the centre of the body-whirl, and is more or less visible above the suture on the two whirls preceding the last; surface of the outer whirl covered with somewhat regular impressions or indentations with ridges between, causing it to look

Fig. 286.

Helix tudiculata.

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as if covered with scales; when these are not apparent, it is marked with oblique wrinkles. Greater diam. 33, lesser 26; height 19 mill.

Helix tudiculata, BINNEY, Bost. Journ. Nat. Hist. IV, 360, pl. xx (1843); Terr. Moll. II, 118, pl. xvi.—PFEIFFER, Mon. Hel. Viv. I, 283; IV, 270.—W. G. BINNEY, Terr. Moll. IV, 7.

Aglaja tudiculata, TRYON, Am. Journ. Conch. II, 313, pl. v, f. 13 (1867).

Fig. 287.

Helix cypreophila.

California, at San Diego, to Washington Territory.

I have lately received this species under the name of "*H. cypreophila*, Newc., Copperopolis, Cal.," from Dr. Newcomb, one of whose specimens is here figured.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
3568	3	San Diego, Cal.	Lieut. Ives.	.....
8551	2	" "	"	Cab. series.

Helix nickliniana, LEA.—Shell subumbilicated, conic-globose, rather thin, the surface lightly marked by the lines of growth, faintly indented and delicately shagreened with fine microscopic granules arranged in quincunx; pale horn-color or sometimes cinereous, girdled with a single narrow chestnut bronze zone, paler at its edges; the whole covered with a thin, yellowish-brown epidermis; spire elevated, whirls six, moderately convex, the outer one ventricose, with some approach to an angular periphery; base tumid, depressed at centre, and perforated by a very small umbilicus; aperture rounded, forming two-thirds of a circle, banded within; peristome white, slightly reflected above, more so below, until at the umbilicus it is quite revolute, and mostly covers the opening. Greater diam. 28, lesser 23; height 19 mill.

Fig. 288.

Helix nickliniana.

Helix nickliniana, LEA, Trans. Am. Phil. Soc. VI, 100, pl. xxiii, f. 84; Obs. II, 100 (1839); TROSCHEL, Arch. f. Nat. 1839, II, 221.—BINNEY (pars), Terr. Moll. II, 119, pl. vi, a.—W. G. BINNEY, Terr. Moll. IV, 7.—PFEIFFER, Mon. Hel. Viv. IV, 269.

Helix californiensis, PFEIFFER, Mon. Hel. Viv. I, 339; III, 229; in CHEMNITZ, ed. 2, 332, pl. lvii, f. 14–15, excl. var. 2 (1846).—REEVE, Con. Icon. no. 661.—Not of LEA.

Helix arboretorum, VALENCIENNES, Voy. de la Venus, Moll. pl. f, f. 3 (see Terr. Moll. IV, pl. lxxvi, f. 13).

Helix nemorivaga, VALENCIENNES, *l. c.* f. 1 (see Terr. Moll. pl. lxxix, f. 11).

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Helix anachoreta, W. G. Binney, Proc. Acad. Nat. Sci. Philad. 1857, 185; Terr. Moll. IV, 11, pl. lxxvi, f. 5.—Pfeiffer, Mon. Hel. Viv. IV, 349.
Aglaja nickliniana, Tryon, Am. Journ. Conch. II, 312, pl. v, f. 12 (1867).
Aglaja anachoreta, Tryon, Am. Journ. Conch. II, 311, pl. v, f. 9 (1867).

California, Santa Cruz to Mendocino Co. (*Cooper*).

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8353	3	San Francisco.	Dr. Bigelow.	.....
4424	.....	.....	.....	.....
4289	4	California.	.....	Animals of these in alcohol. *Vid.* 8461.
8461	28	"	.....	Alcohol. 8 ex'a without shell.
8548		"	.....	Cab. series. Animal
8719	1	San Francisco.	Rowell.	....[with last.
8721	3	"	"	Vars.
9245	1	Tomales, Cal.	Dr. Newberry.	.....

Helix redimita, W. G. Binn.—Shell imperforate, globose-conic, rather thin, wrinkled, covered with minute and crowded granulations; color reddish-brown; apex free from granules, rather blunt; spire elevated; suture impressed; whirls six, convex, the last quite large and rounded, falling towards the aperture, and banded with reddish-brown above the middle; aperture rather large in proportion to the size of the shell, very oblique, transversely rounded, within showing the band; peristome simple, reddish-ash color, thickened, reflected slightly at the base, ends approached; umbilicus entirely covered with a white callus. Greater diam. 31, lesser 17; height 12 mill.

Fig. 289.

Helix redimita.

Helix redimita, W. G. Binney, Proc. Acad. Nat. Sci. Philad. 1857, 183; Terr. Moll. IV, 10.—Pfeiffer, Mon. Hel. Viv. IV, 349.
Helix nickliniana, var., Binney, Terr. Moll. III, pl. vi, f. 1 (except middle figure).
Polymita redemita, Tryon, Am. Journ. Conch. II, 320, pl. vi, f. 7 (1867).

San Clemente Island, California.
May it not prove a less developed form of *H. intercisa*?

Helix intercisa, W. G. Binn.—Shell globose-conic, with five slightly rounded whirls; spire little elevated; suture distinct; upon the body-whirl a dark revolving band, hardly discernible; aperture very oblique, shape of a horseshoe; peristome thickened, heavy, dirty white, slightly reflected at the umbilicus, which it entirely conceals, near its junction with the columella furnished with a tooth-like process, the extremities connected by a heavy ash-colored callus, which is spread more lightly

Fig. 290.

Helix intercisa.

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over the whole parietal wall; epidermis grayish-yellow, apex rufous; the striæ of growth are very numerous and distinct, crossed by numerous, regular, revolving lines, so deeply impressed as to entirely separate them into small sections; thus the whole surface of the shell is divided into minute, raised parallelograms, separated by the deep longitudinal and horizontal furrows. Greatest diam. 22, lesser 19; height 15 mill.

Helix intercisa, W. G. Binney, Proc. Acad. Nat. Sci. Philad. 1857, 18; Proc. Bost. Soc. Nat. Hist. VI, 156 (1857); Terr. Moll. IV, 8.—Pfeiffer, Mon. Hel. Viv. IV, 349.

Helix nickliniana, var., Binney, Terr. Moll. II, 120; III, pl. vi, f. 1 (middle figure).

Helix crebristriata, Newcomb, Proc. Cal. Acad. Nat. Sci. III, 116.

Polymita intercisa, Tryon, Am. Journ. Conch. II, 319, pl. vi, f. 4 (1867).

Arionta crebristriata, Tryon, *l. c.* II, 317, pl. vi, f. 2 (1867).

This species, until quite recently known only by the single specimen in Dr. Binney's collection, supposed to be from Oregon, has recently been described from San Clemente Island, California, under the name of *H. crebristriata*, by Newcomb, one of whose specimens is here figured. An apparently semi-fossil form occurs, with thick shell, heavy, rough growth beyond the peristome, which is made continuous by its ends being joined by a very solid, raised callus.

Fig. 291.

Helix crebristriata.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9348	3	.....	Dr. J. G. Cooper.	(*H. crebristriata*, [Newc., type.)

Helix exarata, Pfeiffer.—Shell umbilicated, depressed-conic, rather solid, malleated and wrinkled, yellowish, with one chestnut band; spire rather acute, conic; whirls seven, equally convex, gradually increasing, the last broader, rounded, scarcely falling in front, narrowed around the open, moderate umbilicus; aperture oblique, broadly lunate; peristome with a light white thickening, the terminations scarcely converging, the right slightly expanded, the columella triangularly dilated above and widening. Greater diam. 30, lesser 25; height 16 mill.

Fig. 292.

Helix exarata.

Helix exarata, Pfeiffer, Proc. Zool. Soc. 1857, 108; Mon. Hel. Viv. IV, 268.—W. G. Binney, Terr. Moll. IV, 12.

Aglaja exarata, Tryon, Am. Journ. Conch. II, 312, pl. v, f. 11 (1867).

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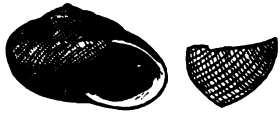
California.

The shell figured I believe to be this species. It is from near San Francisco.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9323	15	Near San Francisco.	Rowell.	.....

Helix reticulata, PFEIFFER.—Shell umbilicate, depressed globose, solid, obliquely striated, and marked with oblong, somewhat regular granulations formed by striæ descending towards the anterior part; yellowish with one revolving reddish band; spire shortly conic; whirls five and a half somewhat convex, the last broad, rounded, not falling in front; umbilicus narrow, not pervious; aperture diagonal, roundly lunate; peristome white, thickened, its ends not converging, the right scarcely expanded, the columellar sloping, dilated above and reflected. Greater diam. 22, lesser 18; height 11½ mill.

Fig. 293.



Helix reticulata.

Helix reticulata, PFEIFFER, Mal. Blatt. 1857, 87; Mon. Hel. Viv. IV, 270; Nov. Conch. I, 120, pl. xxxiv, f. 47.—W. G. BINNEY, Terr. Moll. IV, 12.

Aglaja reticulata, TRYON, Am. Journ. Conch. II, pl. vi, f. 18 (1866), no desc.

Helix bridgesii, NEWCOMB, Proc. Cal. Acad. Nat. Sci. II, 91 (1861).

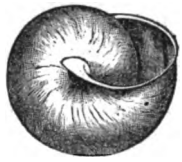
Aglaja bridgesii, TRYON, Am. Journ. Conch. II, 313, pl. xi, f. 29 (1866).

Fig. 294.

Los Gatos, California.

The figure is a fac-simile of one of Pfeiffer's.

Specimens of Helix bridgesii received from Dr. Newcomb resemble forms of *H. reticulata* so closely that I believe the two to be identical. An authentic specimen, loaned by Dr. Newcomb, is figured here.



Helix bridgesii.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9355	1	Centra Costa Co.	Dr. J. G. Cooper.	.....

Helix ramentosa, GOULD.—Shell perforate, suborbicular, depressed, thin, reddish, with a smoky, white-margined band revolving at

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the periphery; granulated with incremental lines and equally oblique, decussating furrows; whirls five and a half, rather convex, the last obtusely angulated; suture deeply impressed; aperture obliquely oblong-ovate; peritreme acute behind, white, decidedly reflected towards the umbilicus; throat reddish. Greater diam. 20, height 12 mill.

Helix ramentosa, GOULD, Proc. Bost. Soc. Nat. Hist. VI, 11 (1845); Terr. Moll. U. S. III, 12.—PFEIFFER, Mon. Hel. Viv. IV, 349.—W. G. BINNEY, Terr. Moll. IV, 13.

Aglaja ramentosa, TRYON, Am. Journ. Conch. II, 314, pl. v, f. 15 (1862).

California; Napa Co. to Santa Clara Co. (*Cooper*).

I am unacquainted with this species, which will perhaps prove identical with the more recently described *H. reticulata*.

Helix californiensis, LEA.—Shell subperforate, ventricose, subglobular, thin and transparent, shining, delicately indented and granulated, faintly but regularly striate, of a pale yellowish horn-color, minutely flecked with pale spots and girded by a narrow brown band, paler at its edges; spire elevated, whirls five, convexly rounded, the last very broad, vesicular; base ventricose; aperture subcircular, silky and banded within; the peristome slightly reflected, thickened within, more everted towards its columellar margin, where it is roundly reflected, nearly covering a very small umbilical perforation. Greater diam. 19, lesser 16; height 15 mill.

Fig. 295.

Helix californiensis.

Helix californiensis, LEA, Trans. Am. Phil. Soc. VI, 99, pl. xxiii, f. 79; Obs. II, 99 (1839); TROSCHEL in Weigm. Arch. 1839, II, 221.—BINNEY, Terr. Moll. II, 121, pl. vi, f 2.—W. G. BINNEY, Terr. Moll. IV, 13.—DEKAY, N. Y. Moll. 46 (1843), not of PFEIFFER,(?) CHEMNITZ, REEVE.

Helix vincta, VALENCIENNES, Voy. de la Venus, Moll. pl. i, f. 2, no descr.—REEVE, Con. Icon. no. 660.—PFEIFFER, Mon. Hel. Viv. III, 183; IV, 269; in CHEMNITZ, ed. 2, II, 487, t. clx, f. 2 (1854).

Arionta californiensis, TRYON, Am. Journ. Conch. II, 317, pl. v, f. 20 (1866).

San Francisco; San Diego, California.

Fig. 296.

Jaw of *Helix californiensis.*

Readily distinguished by its thin, delicate shell and globose form.

Jaw arcuate, of uniform width throughout; ends blunt; anterior surface with only four distant, stout ribs, crenulating either margin.

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Lingual membrane with 176 rows of 56—1—56 teeth; centrals and laterals long, obtusely pointed; uncini long, with two or three denticles.

Fig. 297.

Lingual dentition of *Helix californiensis*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8346	1	Interior of California.	Com. Wilkes.	.....
8347	3	Point Cypress, Monte-	C. A. C.	.....
3294	2	Monterey. [rey.	Trowbridge.	Cab. series.

Helix carpenteri, NEWCOMB.—Shell umbilicated, roundly conical, apex obtuse, obscurely marked with one brown band, well striated, under the lens numerous very minute spiral striations; whirls five and a half, rounded; suture well marked; aperture circular, with terminations approximating; peristome moderately expanded, at the columella broadly so, but not adherent. Greater diam. 23, height 16½ mill. (*Newcomb.*)

Fig. 298.

Helix carpenteri.

Helix carpenteri, NEWCOMB, Proc. Cal. Acad. Nat. Sci. (March, 1861), II, 103.

Aglaja carpenteri, TRYON, Am. Journ. Conch. II, 313 (1866).

Helix remondi, TRYON, Proc. Acad. Nat. Sci. Philad. 1863, 281, pl. ii, f. 1.

Arionta remondi, TRYON, Am. Journ. Conch. II, 318, pl. v, f. 18 (1866).

Cinaloa (*Tryon*); Trinidad, Lower California (*Gabb*); Tulare Valley (*Newcomb*).

The shell figured was received from Dr. Newcomb.

Helix mormonum, PFEIFFER.—Shell umbilicated, depressed, rather thin, with arching striæ, light red; spire scarcely elevated-conic; whirls six, slightly convex, gradually increasing, the last convex above and below, rather swollen before, scarcely falling, ornamented above the

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middle with a chestnut band doubly edged with white, convex below; umbilicus moderate, conical; aperture very oblique, ear-shaped, lunate; peristome with a white thickening, its ends converging, the right very much arched, expanded, the columellar curved and sloping, reflected, expanded above. Greater diam. 29, lesser 24½; height 12½ mill.

Fig. 299.

Helix mormonum.

Helix mormonum, PFEIFFER, Proc. Zool. Soc. 1857, 109; Mon. Hel. Viv. IV, 276.—W. G. BINNEY, Terr. Moll. IV, 16, pl. lxxix, f. 21.

Aglaja mormonum, TRYON, Am. Journ. Conch. II, 314, pl. v, f. 14 (1867).

Mormon Island, California; San Joaquin Valley, north to Mt. Shasta (*Newcomb*[1]).

The specimens lately received from California, which appear to be referable to this species, are singularly granulated on the first one and a half apical whirls, and the epidermis of the next two or three whirls is sparingly ornamented with small but very distinct raised lines or points, something like prostrate hairs, being part of and same color as the epidermis.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9345	4	Near Pitt River, Cal.	Dr. J. G. Cooper.	.....

Fig. 300.

Helix sequoicola.

Helix sequoicola, J. G. COOPER.—Shell umbilicated, globosely depressed, rather thick, of a light chestnut color, lighter below, with a band of darker color revolving above the middle of the body-whirl, between two equal bands of white; surface but slightly roughened by coarse, irregular wrinkles of growth, often decussated with coarse indented revolving lines, the upper whirls with prominent, crowded, minute, isolated granulations, running in ridges or series in an oblique direction to the wrinkles of growth; spire obtusely conic; whirls six, but slightly convex, the last more globose, slightly descending before; umbilicus moderate, conical; aperture very oblique, subcircular; peristome white,

[1] Newcomb says (Pr. Cal. Ac. III, 119) that *H. cultellata*, Thompson, is identical with this species. It does not even belong to the same genus.

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thickened, ends approaching, its columellar portion widened and reflected, partially covering the umbilicus. Greater diam. 27, lesser 21; height 12 mill.

Helix sequoicola, J. G. COOPER, Proc. Cal. Acad. III, 259 (1866).
Aglajo sequoicola, TRYON, Am. Journ. Conch. III, 160, pl. xi, f. 27 (1867).

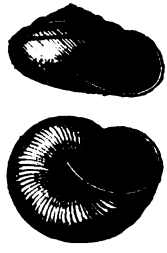
Santa Cruz Co., California.

In form and coloring much allied to *Helix mormonum*, but readily distinguished by its peculiar sculpturing. It may be hirsute when in a perfect condition.

The shell described and figured was received from Dr. Cooper.

Helix traskii, NEWCOMB.—Shell umbilicated, globosely-depressed, very thin, translucent, dark horn-colored, with a revolving chestnut band, doubly edged with white; with delicate oblique striæ and crowded microscopic revolving lines; spire hardly elevated, apex flattened; whirls six, slightly convex, gradually increasing, the last rather plane above, inflated below, not falling before, banded above the middle; umbilicus moderate, conical; aperture very oblique, lunately semicircular, banded within; peristome with a white thickening, regularly rounding, its terminations joined by a light transparent callus, that of the columella widened, subreflected, but not at all covering the umbilicus. Greater diam. 21, lesser 16; height 9 mill.

Fig. 301.



Helix traskii.

Helix traskii, NEWCOMB, Proc. Cal. Acad. Nat. Sci. II, 91 (1861).
Aglaja traskii, TRYON, Am. Journ. Conch. II, 314, pl. v, f. 16 (1866).

Los Angelos, California.

The specimen figured was received from Dr. Newcomb. It may not be entirely mature.

Helix dupetithouarsi, DESHAYES.—Shell umbilicated, orbicularly-convex, smooth or substriate, dark chestnut, lighter above, with a dark red, white-margined band; spire obtusely conoid; whirls seven to eight, narrow, rather convex, the last inflated; aperture ovate semilunar, white, and banded within; peristome simple, narrowly reflected, its columellar end arched, dilated and arched above, not covering the moderate umbilicus. Greater diam. 29, lesser 25; height 17 mill.

Fig. 302.

Helix dupetithouarsi.

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Helix dupetithouarsii, Deshayes, Rev. Zool. 1839, 360; in Guerin, Mag. 1841, tab. xxx; in Fer. I, 169, pl. xcvii, f. 8–10.—Pfeiffer, Mon. Hel. Viv. I, 338, excl. var.; III, 229; in Chemnitz, ed. 2, I, 328, pl. lviii, f. 6–7 (not pl. lvi, f. 3–5).—Reeve, Con. Icon. 659.—Gould, Terr. Moll. III, 14.—W. G. Binney, Terr. Moll. IV, 15, pl. lxxvi, f. 9; Pac. R. R. Rep. VI, 114 (1857).

Helix oregonensis, Lea, Trans. Am. Phil. Soc. VI, 100 (1839); Obs. II, 100, pl. xxviii, f. 9; Troschel, Arch. f. Nat. 1839, II, 221.—DeKay, N. Y. Moll. 46.—Pfeiffer, formerly, Mon. Hel. Viv. I, 428.

Aglaja dupetithouarsi, Tryon, Am. Journ. Conch. II, 315, pl. v, f. 17 (1866).

Puget Sound to San Diego.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8320	7	Klamath Lake, Oregon.	.....	.....
8321	1	Benicia.	.....	.....
8322	2	Tulan Lake, Cal.	.....	.....
8323	1	San Diego, Cal.	Lieut. Ives.	.....
8293	5	Monterey.	Lt. W. P. Trowbridge.	.....
8324	2	Interior of California.	Com. Wilkes.	.....
8325	4	Point Cypress, Monterey.	.....	.....
8326	1	Interior of California.	Com. Wilkes.	*nicklíniana?* = *oregonensis*, Lea.
8327	1	Puget Sound.	.....	
8459	13	Monterey, Cal.	Lt. W. P. Trowbridge.	With animal in alco-
8549	4	Point Cypress, Monterey.	Dr. C. A. Canfield.	Cab. series. [hol.
8559	3	Monterey.	"	"

Helix ruficincta, Newcomb.—Shell depressed-globose, umbilicated, rather thin, smooth, surface scarcely broken by incremental striæ, with occasional revolving lines, horn-color, with a median, revolving dark brown band, margined with white; spire little elevated; whirls five to six, scarcely convex, the last flattened-globose, descending at the aperture, convex below; aperture banded within, oblique, roundly lunate; peristome white, thickened, its inner margin obtusely rounded, the right portion straight, basal and columellar portions reflected, partially concealing the umbilicus. Greater diam. 17, lesser 14; height 9 mill.

Fig. 303.

Helix ruficincta.

Helix rufocincta, Newcomb, Proc. Cal. Acad. Nat. Sci. III, 117 (1864).

Aglaja rufocincta, Tryon, Am. Journ. Conch. II, 315, pl. vi, f. 20 (1866).

San Diego and Catalina Isl., California.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9349	3	Catalina Island.	Dr. J. G. Cooper.	.....

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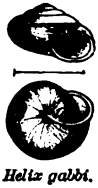
Helix gabbi, NEWCOMB.—Shell subperforate, depressed-globose, thin, smooth, very delicately striated, dirty white, darker above, with a median revolving, white-margined brown band; spire little elevated; whirls five, rather convex, the last flattened globose, descending at the aperture; aperture lunately rounded, oblique; peristome white, thickened, somewhat reflected, the columellar portion almost covering the umbilicus. Greater diam. 10, lesser 8; height 5 mill.

Fig. 304.

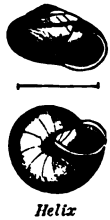


Helix gabbi.

Helix gabbii, NEWCOMB, Proc. Cal. Acad. Nat. Sci. III, 117 (1864).

Aglaja gabbii, TRYON, Am. Journ. Conch. II, 315, pl. vi, f. 19 (1866); III, pl. xi, f. 31 (1867).

Fig. 305.



Helix tenuistriata.

San Clemente Island, California.

Under the name of *H. tenuistriata* (certainly not of Binney) I have received a shell from Catalina Island, apparently a less developed form of *H. gabbi*. It is here figured.

Helix facta, NEWCOMB.—Shell imperforate or subperforate, globose or depressed-globose, smooth, shining, surface hardly broken by delicate incremental striæ and revolving lines, light fawn color above, below lighter, with a median, white-margined, revolving band of a darker colored hue; spire elevated, apex obtuse; whirls five to six, rather convex, the last slightly descending, globose; aperture oblique, banded within; peristome thickened, brownish, shining, its inner margin rounded, reflected, the columellar portion dilated, appressed, partially or entirely covering the umbilicus. Greater diam. 14, lesser 12; height 8 mill.

Fig. 306.

Helix facta.

Helix facta, NEWCOMB, Proc. Cal. Acad. Nat. Sci. III, 118 (1864).

Aglaja facta, TRYON, Am. Journ. Conch. III, 162, pl. xi, f. 32 (1867).

Sta. Barbara Island, California. On this and San Nicolas Island is found a larger, heavier, extinct variety.

Fig. 307.

Jaw of *Helix facta.*

Jaw arcuate, of equal breadth throughout; anterior surface with distant, stout ribs, denticulating either margin.

Lingual membrane with 114 rows of 29—1—29 teeth; centrals long, stout, obtuse, laterals long, acutely pointed with a short side-cusp, becoming modified and merging into wide irregularly-pointed uncini.

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Fig. 308.

Lingual dentition of *Helix facta*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9346	4	Sta. Barbara Isl., Cal.	Dr J. G. Cooper.	.....
9350	4	" "	"	.....

Helix kelletti, FORBES.—Shell narrowly umbilicated, depressed-globose, thin, wrinkled, granulated, fulvous; spire subturbinated, with dirty reddish blotches and one red revolving band; whirls six, rather convex, the last with a white band at its periphery, and inflated on its under surface; aperture roundly lunate, light red and banded within; peristome somewhat reflected, its columellar portion dilated, reflected, covering the umbilicus. Greater diam. 22, lesser 19; height 19 mill. (*Forbes.*)

Fig. 309.

Helix kelletti.

Helix kelletti, FORBES, Proc. Zool. Soc. London, 1850, 55, pl. ix, f. 2, a, b.—REEVE, Con. Icon. no. 665 (1852).—PFEIFFER, Mon. Hel. Viv. III, 183; in CHEMNITZ, ed. 2, II, 467, pl. clvi, f. 19, 20 (1853).—W. G. BINNEY, Terr. Moll. IV, 17, pl. lxxxvi, f. 12.

Arionta kelletti, TRYON, Am. Journ. Conch. II, 317, pl. vi, f. 1 (1866).

San Diego. Catalina Island, San Nicolas Island, California.

The specimen figured is from Catalina Island, California. I am not positive that it is correctly referred to *H. kelletti*. The umbilicus is entirely closed in mature specimens. There are traces on different parts of each shell of three different series of sculpturing; the wrinkles of growth, revolving impressed lines, and a series of minute granulations running obliquely, sometimes almost perpendicularly, to the incremental wrinkles.

Forbes' original figure of *H. kelletti* is copied in the fourth volume of the Terrestrial Mollusks.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
3568	4	San Diego, Cal.	Lieut. Ives.	.....
8552	2	" "	"	Cab. series.

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Helix stearnsiana, GABB.—Shell narrowly umbilicated, subglobose, solid, of a dirty white color, irregularly mottled with crowded ashy blotches, grouped into revolving series below, with a decided wide, brownish revolving band above; with delicate oblique incremental striæ, unequally cut by revolving lines; spire elevated; whirls five, rather convex; aperture oblique, semicircular; peristome simple, acute, its columellar termination white, expanded, reflected over the half concealed umbilicus. Greater diam. 22, lesser 17; height 12 mill.

Fig. 310.

Helix stearnsiana.

Helix stearnsiana, GABB, Am. Journ. Conch. III, 235, pl. xvi, f. 1 (1867).

Lower California, from Sta. Tomas to Rosario, under stumps of Maguey. (*Gabb.*)

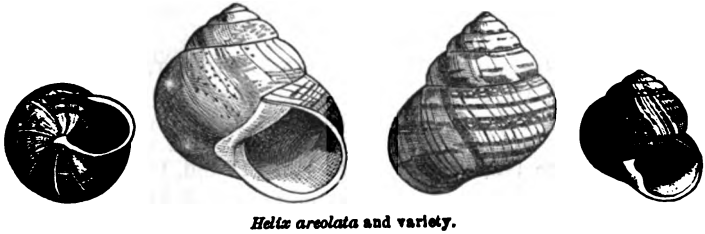
The shell figured and described was received from Dr. Newcomb. It may not be entirely mature.

SUBGENUS **EUPARYPHA**, Hartm.

Shell perforate, depressed-globose, corneo-calcareous, banded; whirls 5, the upper ones flattened, carinate, the last inflated; aperture dilate-lunar, often labiate within, its columellar margin reflexed.

Helix areolata, SOWERBY.—Shell perforated, orbicularly conoid, striated, shining, white, variously ornamented with revolving interrupted reddish lines; spire depressed-conoid; whirls five, rather convex, the last scarcely descending, somewhat convex at base; aperture roundly lunar,

Fig. 311.



Helix areolata and variety.

smoky within; peristome acute, somewhat thickened within, its columellar portion shortly arched, dilated, reflected, with one tooth-like

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callosity (sometimes wanting), and almost covering the umbilicus. Greater diam. 26, lesser 23; height 18 mill.

Helix areolata, Sowerby, Brit. Mus.—Pfeiffer in Zeitschr. f. Mal. 1845, II, 154; Mon. Hel. Viv. I, 152; in Chemnitz, ed. 2, I, 248, pl. xxxvi, f. 10–13.—Philippi, Icon. II, 15, p. 184, pl. ix, f. 4 (1847).—Gould, Terr. Moll. III, 15.—W. G. Binney, Terr. Moll. IV, 19, pl. lxxvi, f. 3, 11.—Reeve, Con. Icon. 664.

Polymita areolata, Tryon, Am. Journ. Conch. II, 319, pl. vi, f. 5 (1866).

Artonta veitchii, Tryon, Am. Journ. Conch. II, 316, pl. v, f. 19 (1866).

The specimens figured are from Cerros Island, California. The species is also quoted from Oregon, and is referred by Newcomb to Margarita Bay.

Cat. No.	No. of Sp	Locality.	From whom received.	Remarks.
8715	1	Cerros Island, Cal.	Dr. Veatch.	Cab. series.
8716	2	" "	"	"
8717	2	" "	"	"
8720	5	" "	"	.....

Helix tryoni, Newcomb.—Shell imperforate, globose-conic, solid, with distant, deep, strong revolving lines cutting through the striæ of increase, of a bluish ash color above, mottled with irregular oblique patches of brown, and with a median revolving line of dark brown, below dirty white; spire conic; apex obtuse, smooth, shining, light horn-color; whirls five to six, scarcely convex, the last globose, descending towards the aperture, inflated below; aperture oblique, subcircular, small, within dark above, lighter below; peristome thickened, dirty white, its terminations somewhat converging, joined by a light callus, right margin slightly expanded, not reflected, that of the columella dilated, scarcely reflected, appressed, obtusely subdentate. Greater diam. 24, lesser 20; height 14 mill.

Fig. 312.

Helix tryoni.

Helix tryoni, Newcomb, Proc. Cal. Acad. Nat. Sci. III, 116 (1864).—W. G. Binney, Am. Journ. Conch. I, 47, pl. vi, f. 1–10 (1865).

Polymita tryoni, Tryon, Am. Journ. Conch. II, 319, pl. vi, f. 3 (1866).

San Clemente Island and San Nicholas Island, California.

Jaw arcuate, of uniform width throughout, ends blunt; anterior surface with stout ribs, denticulating either margin. Figures of the jaws of nine mature individuals are given, showing that the

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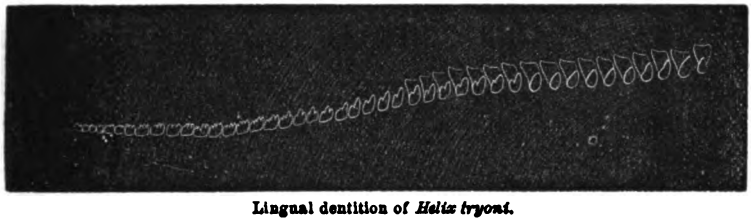
number and arrangement of the ribs is not constant; a fact noticed in other species.

Fig. 313.

Jaws of *Helix tryoni.*

The lingual membrane has 190 rows of 43—1—43 teeth each; centrals and first nine laterals obtusely conical; last seven laterals

Fig. 314.



Lingual dentition of *Helix tryoni.*

and first five uncini of same shape, but with obtuse side cusp; balance of uncini serrated.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9343	1	San Nicholas Isl., Cal.	Dr. J. G. Cooper.	Figured.
9344	5	Santa Barbara Isl., Cal.	"	.....

Helix pandorse, Forbes.—Shell imperforate, globose-conic, rather solid, reddish above, violet on the apex, ashy below, bound with numerous, interrupted, light blotches and lines; whirls five, rounded; suture im-

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pressed; aperture subcircular; peristome narrowly reflected, white, its ends approaching; throat bluish; columella thickened, rounded. Greater diam. 17, lesser 16; height 14 mill.

Fig. 315.

Helix pandoræ.

Helix pandoræ, FORBES, Proc. Zool. Soc. 1850, 55, pl. ix, f. 3, a, b.—REEVE, Con. Icon. 671.—PFEIFFER, Mon. Hel. Viv. III, 127; in CHEMNITZ, ed. 2, III, 467, pl. clvi, f. 17, 18 (1853).—GOULD, Terr. Moll. III, 15.—W. G. BINNEY, Terr. Moll. IV, 18, pl. lxxvi, f. 8.

Helix damascenus, GOULD, Proc. Bost. Soc. Nat. Hist. Oct. 1856, VI, 11.

Polymita pandoræ, TRYON, Am. Journ. Conch. II, 320, pl. vi, f. 8 (1866).

Margarita Bay, Lower California.

The specimen figured wants the characteristic revolving lines and blotches.

Helix levis, PFEIFFER.—Shell perforate, globose, thin, smooth, obliquely striate, obsoletely granulated, white, varied with regular series of spots or bands of horn-color; spire short, rather acute; whirls five, scarcely convex, the last inflated; aperture roundly lunar, within somewhat yellow; peristome acute, somewhat thickened within, its columellar portion dilated above, arched and reflected, almost covering the perforation. Greater diam. 16, lesser 14; height 13 mill.

Fig. 316.

Helix levis, var.

Var. *β*. The columellar portion of the peristome with a single obtuse, tooth-like callosity.

Helix levis, PFEIFFER, Mon. Hel. Viv. I, 154; III, 128; Zeitschr. f. Mal. 1845, 152; in CHEMNITZ, ed. 2, I, 249, pl. xxxvi, f. 16, 17 (1846).—REEVE, Con. Icon. 1214.—W. G. BINNEY, Terr. Moll. IV, 18. pl. lxxvi, f. 10.

Polymita levis, TRYON, Am. Journ. Conch. II, 320, pl. v, f. 21? (1866).

Columbia River.

Dr. Newcomb doubts its being a Californian or Oregon species.

SUBGENUS **TACHEA**, Leach.

Shell imperforate, globose or subdepressed, white or yellow, ornamented with distinct bands; whirls 5, the last convex, tumid, descending at the aperture; aperture broadly lunate, obsoletely angular; peristome thickened, reflexed, its columellar margin constricted, callous.

Animal (of *H. hortensis*): head and neck blackish, with a slight tinge of brown; eye-peduncles smoky; eyes black; base

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of foot inky, posterior extremity dirty flesh-color; foot rather slender, terminating acutely; respiratory foramen surrounded with a blackish circle; length about twice the breadth of the shell.

Helix hortensis, Müller.—Shell imperforate, subglobose; epidermis shining, smooth, olivaceous-yellow, and often variously ornamented with rufous horizontal bands or lines; whirls five, convex; spire somewhat elevated; suture, at the extremity of the last whirl, curved towards the aperture; peristome slightly reflected, white, obsolete on the base, with the margin thickened internally; aperture rounded, slightly contracted at the base by the thickening and indentation of the peristome; umbilicus covered, indented; base convex. Greater diam. 20, lesser 17; height 12 mill.

Fig. 317.

Helix hortensis.

Helix hortensis, Müller, &c.—Pfeiffer, Mon. Hel. Viv. III, 195.—Mrs. Sheppard, Tr. Lit. Hist. Soc. Quebec, I, 193 (1829).—Gould, Invert. 172.—Binney, Terr. Moll. II, 111, pl. viii.—W. G. Binney, Terr. Moll. IV, 51.—Morse, Amer. Nat. I, 186, f. 16 (1867).

Helix subglobosa, Binney (formerly), Bost. Journ. Nat. Hist. I, 485, pl. xvi (1837).—DeKay, N. Y. Moll. 33, pl. ii, f. 14; pl. iii, f. 39.

Tachea hortensis, Morse, Journ. Portl. Soc. I, 10, f. 11, pl. iv, f. 12 (1864).—Tryon, Am. Journ. Conch. II, 321, pl. vi, f. 14, 15 (1866).

An European species, introduced by commerce (?) to the northeastern portion of North America. It is found on islands along the coast from Newfoundland to Cape Cod, and on the main-land plentifully in Gaspé, C. E.; also along the St. Lawrence; Vermont (?), Connecticut (?), &c. It also inhabits Greenland.

Fig. 318.

Jaw of *Helix hortensis.* [Morse.]

Jaw arcuate, of uniform width throughout; ends blunt; centre of anterior surface with a few stout, distant ribs, denticulating both margins. Compare the fac-simile of Moquin-Tandon's figure of the jaw of a French specimen.

Fig. 319.

Jaw of *Helix hortensis.* [Moquin-Tandon.]

Lingual membrane with 116 rows of 32—1—32 teeth each; centrals long, obtusely conical; first laterals of same shape,

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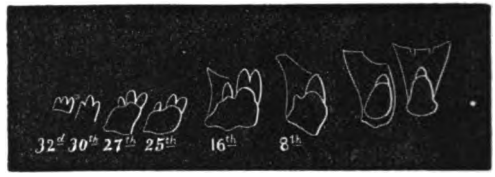
gradually becoming modified into uncini with irregular and obtusely rounded denticles.

Fig. 320.



Lingual dentition of *Helix hortensis*. [MORSE.]

The *Helix nemoralis* of Europe, distinguished readily from *H. hortensis* by its black peristome, but by many considered identical, does not appear to have been introduced from Europe into the New England States or British Provinces. In 1857 I imported some hundred living specimens from near Sheffield, England, and freed them in my garden, in Burlington, New Jersey. They have thriven well and increased with great rapidity, so that now (1865) the whole town is full of them. They retain the habit of the species of climbing hedges and trees, not remaining concealed under decaying leaves, logs, &c., like the American *Helices*. Fig. 321 is drawn from Burlington specimens. The experiment of introducing the *Helix nemoralis* is interesting, as showing the adaptability of the species to a new climate. Other species, among them *H. lapicida* from England, and *Stenogyra decollata* from Charleston, S. C., placed in my garden at the same time, disappeared at once.

Fig. 321.

Helix nemoralis.

The jaw of a Burlington specimen is very strongly arched, with four stout ribs on its anterior surface, denticulating each margin.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8022	4	Massachusetts.	W. Stimpson.	(*H. subglobosa.*)
8023	2	Ils. in Casco Bay, Me.	.....	"
8024	1	Halifax, N. S.	Villins.	"
8618	4	House Is., Manchester,	W. G. Binney.	Cab. series.
8619	3	Mass., Ils. [Mass.	W. Stimpson.	"
8764	6	" "	"	.....
9162	1	Ludlowville, Cayuga L.	Mrs. H. W. Parker.	.....

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SUBGENUS **POMATIA**, (Leach) Beck.

Shell imperforate or subimperforate, globose, striate, horny-calcareous, generally banded; whirls 4–6, convex, the last large, ventricose, descending; aperture lunate-orbicular, peristome patulous or straight, within labiate with callus, the columellar margin reflected, generally callous.

Helix aspersa, MÜLLER.—Shell imperforate, subglobose, rather thin, the surface rather coarsely and irregularly striate, and finely wrinkled and indented; the ground-color is yellowish or grayish, with chestnut-colored bands of various width, across which are narrow undulating flammules of yellowish; the spire is rather obtuse, composed of four or five moderately convex whirls, the principal one being very large and ventricose; the aperture is large, a little oblique, rounded lunate; the peristome white, sharp, turned slightly outward, and in the region of the umbilicus turning over the columella in a broad appressed callus, which is continued to the upper junction of the peristome. Greatest diam. 32, height 22 mill.

Fig. 322.

Helix aspersa.

Helix aspersa, MULLER, Verm. II, 59.—PFEIFFER, Mon. Hel. Viv. I, 241.—DEKAY, N. Y. Moll. 47 (1843).—BINNEY, Terr. Moll. II, 117, not in plate.—W. G. BINNEY, Terr. Moll. IV, 51, pl. lxxvii, f. 4.

Pomatia aspersa, TRYON, Am. Journ. Conch. II, 322, pl. vi, f. 16 (1866).

In gardens in Charleston, S. C., where it still exists. Also has been found at New Orleans; Portland, Maine; Nova Scotia; Santa Barbara, California. It is an European species, accidentally introduced into this country.

Fig. 323.

Jaw of *Helix aspersa*, young and mature. [MOQUIN-TANDON.]

Moquin-Tandon describes the jaw of *H. aspersa* as slightly arcuate, somewhat attenuated towards the blunt ends; anterior surface with stout, distant ribs, denticulating either margin.

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Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7945	1	Charleston, S. C.	Lieut. Kurtz.	.....
8397	2	" "	W. G. Binney.	Cab. series.

SUBGENUS **POLYMITA**, Beck.

Shell with the perforation open or closed, globose, shining; spire short; whirls 4–5, the last large, deflexed at the aperture; columella dilated at the base; aperture contracted, subvertical, roundly lunate; peristome simple, obtuse, labiate within, its margins distant.

Animal (of *H. varians*, see Terr. Moll. IV, pl. lxxviii, f. 22) stout, anteriorly blunt, with long eye-peduncles; posteriorly long, acutely terminating.

Helix varians, MENKE.—Shell subimperforate, of medium size, solid, conic-globose, delicately striate, but leaving the surface smooth and shining; the ground-color is variable, being white, dusky, greenish or reddish, and either plain or variously encircled by dark bands; the apex and the peristome, especially the columellar portion, is always rose red, and generally, likewise, the throat; the spire is elevated, composed of about five and a half convex whirls, the outermost broadly rounded at the periphery; the base is moderately convex and perforated by a minute umbilicus, nearly covered by the expanded and flattened peristome; aperture small, approaching two-thirds of a circle; peristome acute, thickened within, a little everted, becoming more so towards its inner junction. Greater diam. 19, lesser 17; axis 15 mill.

Fig. 324.

Helix varians.

Helix varians, MENKE, teste PFEIFFER.—PFEIFFER, Mon. Hel. Viv. I, 238; in CHEMNITZ, ed. 2, II, 221, pl. cix, f. 1–5.—W. G. BINNEY, Terr. Moll. IV, 51, pl. lxxviii, f. 22.

Helix carnicolor, PFEIFFER, Symb. I, 37.—DESHAYES in FER. I, 205, pl. xxix, A, f. 14–17.—REEVE, Con. Icon. no. 283 (1852).

Helix pisana, PFEIFFER in CHEMNITZ, IX, P. 2, 139, t. cxxxii, f. 1186, 87.—FERUSSAC, Hist. *l. c.* ?—Not of MULLER.

Helix submeris, MICHELS, Bost. Proc. I, 187 (1844).—PFEIFFER, Mon. Hel. Viv. III, 183.

Helix rhodocheila, BINNEY (formerly), Terr. Moll. I.

Hemotrichus hæmastomus, SWAINSON, Malac. 165, f. 19.?

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Helix polychroa, Binney, Terr. Moll. II, 123, pl. xlvi; xlvii.
Polymita varians, Tryon, Am. Journ. Conch. II, 321, pl. vi, f. 9–13 (1866).

Key West, Key Biscayne, Cape Florida. Also at New Providence.

Jaw[1] strongly arched; ends attenuated, pointed; anterior surface smooth; concave margin simple, with an obtuse, median projection.

Fig. 325.

Jaw of *Helix varians*.

Lingual dentition as in *Helix alternata, monodon, sayii*, &c.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7930	6	Key Biscayne, Fla.	G. Wurdemann.	.....
7931	3	Florida Keys.	.....	.....
8893	4	Key Biscayne, Fla.	G. Wurdemann.	Cab. series.

Subgenus **AMPELITA**, Beck.

Shell broadly umbilicated, depressed, orbicular; whirls 4–5, the last more or less angulated or carinated, falling before, convex at base, angularly passing into a spreading umbilicus; aperture lunately-elliptic or irregularly rhomboid; peristome reflected, its terminations approaching, usually joined by callus.

Helix rowelli, Newcomb.—Shell broadly umbilicated, orbicular, depressed, opaque white, with a revolving chestnut band, polished, very finely obliquely striate, hirsute? or granulated; whirls 4½, convex, the last large, flattened, anteriorly descending; spire but little elevated, at the apex projecting like a nipple; suture moderately marked; aperture very oblique, truly circular; peristome thin, slightly reflected, margins approximated, continued by callus adhering to the parietal wall of the aperture. Greater diam. 20, lesser 15; height 7 mill.

Fig. 326.

Helix rowelli.

Helix rowelli, Newcomb, Proc. Cal. Acad. Nat. Sci. III, 181 (1865).
Aglaja rowellii, Tryon, Am. Journ. Conch. II, 316, pl. xi, f. 30 (1867).
Helix lōhrii, Gabb, Am. Journ. Conch. III, 236, pl. xvi, f. 2 (1867).

[1] The same style of jaw exists in *Helix microphysa, albersiana*, and *disculus*, but not in *Helix muscarum*.

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Helix lohrii, was found by Mr. Gabb on the table-lands near Malejo, Lower California. Specimens received from him agree with the type of *H. rowelli* lent me for figuring by Dr. Newcomb (Fig. 326).

The shell is much like a gigantic *H. pulchella*.

Doubtful, Spurious, Extralimital Species of Helix.

Helix —— (Sheppard, Trans. Lit. and Hist. Soc. Quebec. I, 194).—Shell thin, conoidal, perforated; spire very flat; margin of lip reflected.

Common in the same place as the above (*H. hortensis*, Plains of Abraham, Quebec); it is a much less shell, with a brown epidermis; the penultimate whirl has an elevated white ridge near the aperture, which appears to be some remains of the last year's lip. (*Sheppard.*) [= *H. rufescens?*]

Helix sagraiana, D'Orbigny, a Cuban species, is erroneously attributed to California (on the authority of Sowerby) by Pfeiffer (Mon. I, 325) and Carpenter (Report, p. 214).

Helix sandiegoensis, Lea, is mentioned by name only by Gould, Pac. R. R. Rep. V, 331.

Helix attenuata, Lake Superior, &c., is given without description by J. de C. Sowerby, in Richardson's Fauna Boreali-Americana (III, 315) together with

Helix gularis,

Helix rudis, and

Helix paludosus (= *H. minuta*).

Helix angulata, Sheppard, is quoted as synonym of *Planorbis campanulatus*, by J. de C. Sowerby, in Fauna Boreali-Americana, III, 315.

Helix pallida, Budgin, Virginia, is quoted as a synonym of an unnamed *Helicella* by G. B. Sowerby (Tankerville Coll. 37), and

Helix corrugata, Budgin, is quoted by the same (p. 42) as a synonym of *Limnæa corrugata*, and

Helix viridata, Budgin, Virginia, is quoted by the same (p. 43) as synonym of *Paludina viridis*, and

Helix imperfecta, Budgin, is quoted by the same (p. ix of Appendix) as synonym of *Melania inermis*.

Helix minuta, True (Proc. Essex Inst. II, pt. 2, p. 193, Salem, Mass. 1860).—Shell minute, rounded conical, smooth, apex obtuse; epidermis of a uniform reddish horn-color; whirls four, rounded above and below, with a well-defined suture; aperture rounded, lip simple and thin, umbilicus broad and deep. Diameter about one-twentieth inch.

Helix peregrina (Bosc, Hist. Nat. des Coq. IV, 57, 1830).—Ovale, imperforée; les tours de spire écartés, décroissants également, l'ouverture ovale.

Schwet, Einl. in Conch. II, tab. iv, f. 11. Se trouve dans les îles de la côte ouest de l'Amérique. (*Bosc.*)

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Helix radiata, LISTER (Europe and Virginia), of Bosc, Hist. IV, 32, appears to be *H. alternata*, as reference is given to Lister's figure of that species.

Helix trivolvis, EATON (Zool. Text-Book, p. 194) = *Planorbis.*

Helix bicarinatus (*id.* 194) = *Planorbis.*

Helix parvus (*id.* 195) = *Planorbis.*

Helix catascopius (*id.* 195) = *Limnæa.*

Helix heterostrophus (*id.* 195) = *Physa.*

Helix subcarinatus (*id.* 195) = *Lioplax.*

Helix virginica (*id.* 195) = *Melania.*

Helix vivipara (*id.* 196) = *Vivipara contectoides.*

Helix decisa (*id.* 196) = *Melantho.*

Helix cumberlandicus, LEA, of WHEATLEY's Cat. U. S. p. 18, is the same, I presume, as *H. cumberlandiana.*

Helix immitissima, LEA, of the same, p. 19 = *H. minutissima?*

Helix pallida, SAY, of same = *H. palliata.?*

Helix depicta (GRATELOUP, Soc. Lin. Bordeaux, XI, 399, pl. i, f. 12, 1839).—Shell subglobose, conic, imperforate, thin, white, very delicately striate, ornamented with varied lines and interrupted bands; lip simple, acute.

Fig. 327.

Helix depicta.

This pretty shell has some points of resemblance with *Helix pisana*, Müll., but is smaller and not umbilicated. The internal edge of the right lip is white instead of rose. The upper surface is covered with numerous yellowish-brown bands, more or less deep, interrupted by oblique lines of same color. Five whirls. Height 11, diam. 15 mill.

Island of St. Thomas; New Orleans.

Helix pisana, MÜLLER, United States.—FERUSSAC, Tabl. Syst. 119.—GRAY, Turton's Manual.—FORBES, Brit. Ass. Rep. 1840, 145.—See Bost. Journ. III, 489. This species is not known to exist in America at the present day (1864).

Helix trumbulli, LINSLEY, Shells of Conn. (Sill. Journ. [1], XLVIII, 280), = *Skenea serpuloides.* See Terr. Moll. IV, 125.

Helix pellucida, FABRICIUS = *Vitrina angelicæ.*

Helix arbustorum. See Terr. Moll. IV, 124, and ADAMS, Cat. Cabinet, 32. Does not inhabit America.

Helix hieroglyphica, BECK, Ind. Am. Sept.? See Terr. Moll. IV, 124.

Helix domestica, STRÖM. See *Vitrina angelicæ.*

Helix dealbata, SAY = *Bulimulus.*

Helix corpuloides. See Terr. Moll. IV, 124.

Helix bonplandi, LAMARCK. See Terr. Moll. IV, 124. JAY, Cat. ed. 2, 33. Tennessee.

Helix haliotoides, FABRICIUS, Fauna Grœnl. 390 (1780) = *Sigaretus.*

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Helix virginea, Wood, Ind. Suppl. p. 21, f. 19 = *Melania virginica*.
Helix urceus, Müller, Dillwyn, Cat. II, 918 = *Ampullaria*.
Helix fuscata, Born, Mus. Virid. 1780, 390, pl. xvi, f. 17. Virginia.
Helix irrorata, Say = *H. lactea*, Muller. See Terr. Moll. IV, 124. Does not now exist in America.
Helix rastellum, Beck, Ind. 8. Am. s.
Helix personata, Lamarck, Ohio. Jay, Cat. ed. 2, 36, 1836, and Villa, Disp. 14, 1841.
Helix punctata, Dillwyn, Cat. II, 899, is from Martinique, not Virginia.
Helix ruderata, Studer, Anthony, Ohio Cat. no. 31 = *striatella*?
Helix variabilis, Drap., North America. See Forbes, Brit. Ass. Rep. 1840, 145; see also Bost. Journ. Nat. Hist. III, 489; Férussac, Tabl. Syst. 48.
Helix (*Eurycratera*) *lineolata*, Lam., is erroneously quoted from North America by Beck (Index, 45).
Helix steenstrupii, Mörch. Greenland. I can find no description of it. *Vide* Terr. Moll. IV, 117.
Helix subcarinata, Wood (Index, Suppl. pl. vii, f. 13) = *Leptoxis*.
Helix dissimilis, Wood (Index, Suppl. pl. vii, f. 18) = *Melantho decisa*.
Helix decisa, Wood (Index, Suppl. pl. vii, f. 19) = *Lioplax subcarinata*.
Helix bidentifera, Phillips (Proc. Acad. Nat. Sci. Philad. I, 27, 1841), North Carolina = *H. barbula*, Charp., of Portugal (*l. c.* p. 133).
Helix palustris, Rackett. See *Limnæa palustris*.
Helix angulata, Rackett. See *Planorbis bicarinatus*.
Helix albella, Dillwyn, Cat. II, 890. Virginia.

Fossil Species of Helix.

Dr. Meek furnishes the following list of fossil species:—

Helix leidyi, Hall & Meek, Am. Ac. Arts and Sci. Boston, V, 394, new ser.
Helix amplexus, Meek & Hayden, Proc. Acad. Nat. Sci. Philad. 1861, 431 = *Planorbis amplexus*, M. & H. Proc. Acad. Nat. Sci. Philad. 1857, 135.
Helix spatiosa, M. & H. (*Macrocyclis*), " " " 1861, 446.
Helix vitrina, " " " " " 1861, 447.
Helix nebrascencis, " " " " " 1861, 431 = *H. occidentalis*, M. & H. *l. c.* 1857, 135 (non Reclus, 1845).
Helix vetusta (nom. trans. ob. *H. v.* Mor. & Dr. 1857, J. C. (2), II, 153), M. & H. Proc. Acad. Nat. Sci. Philad. 1860, 431 = *H. vitrinoides*, M. & H. *l. c.* 1857, 135 (non Deshayes, 1830).
Helix evansi, M. & H. *l. c.* 1860, 175.
Helix obliqua, M. & H. *l. c.* 1857, 134.

EUCALODIUM? Crosse & Fischer.

[The generic position of the following species is uncertain. See Bland, Ann. N. Y. Lyc. IX.]

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Cylindrella taylori, PFEIFFER.—Shell not rimate, cylindrically subulate, integral, thin, paper-like, with stout, coarse, longitudinal wrinkles, becoming gradually delicate towards the apex, which is smooth, color dead white; spire much attenuated, apex obtuse; suture impressed; whirls nine, the upper ones rather convex, the two lower ones flattened, the last obtusely carinated below, slightly twisted, and produced beyond the body of the shell, in front rapidly descending, acutely carinated, disjoined, produced; aperture semicircular, very oblique; peristome continuously free, acute, thin, the columellar portion effuse. Length 45, diameter 8; aperture 10 long, 8½ mill wide.

Fig. 328.

Cylindrella newcombiana.

Clausilia (Balea) taylori, PFEIFFER, Proc. Zool. Soc. 1861, 27, pl. ii, f. 7.

Cylindrella newcombiana, GABB, Am. Journ. Conch. III, 237, pl. xvi, f. 3 (1867).

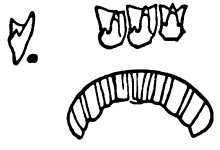
Eucalodium newcombianum, BLAND, Ann. N. Y. Lyc. IX.

Central range of mountains, Lower California.

The shell figured was received from Dr. Newcomb. Its generic position is somewhat doubtful.

Jaw arcuate, with a slight median projection, longitudinally costate, the costæ 9–13, flattened, their terminations scarcely produced at the anterior or cutting margin, parallel with which are a few fine striæ.

Fig. 329.



Jaw and teeth of *Cylindrella newcombiana.*

Lingual membrane with 126 rows of 32—1—32 teeth, centrals with one long median cusp, and two short, blunt side-cusps, laterals the same, without the inner side-cusp.

COLUMNA, PERRY.

Shell sinistral or dextral, subulately turreted, decussately granulated; apex obtuse, whirls constricted at the suture, the lower impressed in the middle; aperture elongated, auriform, narrowed posteriorly; columella callous, loosely spirally twisted, forming an open canal along the length of the spire, the base abruptly truncate; peristome simple, straight, acute.

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SUBGENUS **RHODEA**, H. & A. Ad.

Shell thin, dextral, clausiliaform; last whirl flattened, the base acutely carinated, excavated beneath; columella arcuated, thickened, subtruncate.

Columna californica, PFEIFFER.—Shell subulate, thin, with very crowded, oblique striæ or wrinkles, waxen white; whirls twelve to thirteen, the upper convex, the last three or four flat, the last exceeding slightly one-sixth the shell's length, sharply carinated at base, below the carina somewhat hollowed out; columella arched, thickened, subtruncated, reaching the base; aperture somewhat four-sided; peristome simple, acute. Length 23, diam. 3½ mill.; aperture 4 mill. long, 2½ wide.

Fig. 330.

Columna californica.

Achatina californica, PFEIFFER, Symb. ad. Hist. Hel. III, 89; Mon. Hel. Viv. II, 267.—REEVE, Con. Icon. 115.—W. G. BINNEY, Terr. Moll. IV, 26, pl. lxxix, f. 19.—BLAND, Ann. N. Y. Lyc. VIII, 166, f. 10 (1865).

Columna californica, CHENU, Man. de Conch. I, 431, f. 3172.

Monterey, California. I have given a copy of Reeve's figure.

I doubt this shell really having been found in California. Fig. 331 represents a specimen from Bogota, New Granada, which seems identical with it. Mr. Bland (*l. c.*) positively asserts that the species should be removed from the American catalogue.

Fig. 331.

Columna californica.

FOSSIL SPECIES OF COLUMNA.

Columna? teres, MEEK & HAYDEN, Proc. Acad. Nat. Sci. Philad. 1860, 431 (= *Bul.? teres*), *Clausilia?* M. & H. *l. c.* 1856, 117.

Columna? vermiculus (*Clausilia?*), MEEK & HAYDEN, Proc. Acad. Nat. Sci. Philad. 1860, 431 (= *Bul.? vermiculus*), M. & H. *l. c.* 1856, 118.

BULIMUS, SCOPOLI.

Shell oblong; aperture longitudinal, margin unequal, peristome thickened, generally expanded, columella pliciform.

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Jaw arcuate, roughened by stout ribs, its concave margin crenated.

Bulimus spirifer, GABB.—Shell rimately perforated, subfusiformly-oblong, thin, with delicate striæ of increase, in some places cut by fine revolving lines, pellucid, of a dead white color, or horn-color; spire turreted conic, apex acute; whirls six, convex, the last equalling two-thirds of the shell's length; aperture truncate-ovate; peristome white, shining, broadly expanded, reflected, acute, columellar portion very broad, widely reflected over the rimation, bearing far within upon its centre an upright, stout, twisted fold, ends approaching, connected by a shining white callus. Length 31, diam. 11; aperture 15 long, 11 mill. wide.

Fig. 332.

Bulimus spirifer.

Bulimus spirifer, GABB, Am. Journ. Conch. III, 236, pl. xvi, f. 5 (1867).

From San Antonio to San Borja, Lower California. Very common (*Gabb*).

The description and figure are drawn from an authentic specimen.

Jaw like that of *Orthalicus*,[1] in about nineteen separate plates, whose overlapping seems to produce narrow longitudinal costæ.

BULIMULUS, LEACH.

Shell oblong, aperture longitudinal, edentulate, peristome thin, margins unequal; columella integral.

Jaw arcuate, with stout anterior ribs.[2]

Lingual membrane (of *B. dealbatus*) broad, central teeth tricuspid, the median cusp very long; laterals bicuspid.

Fig. 333.

Lingual membrane of *Bulimulus dealbatus*.

[1] This does not agree with the generic description.

[2] Martens and Albers say "composite;" but I have not found it so with all those I have examined.

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SUBGENUS **DRYMÆUS**, Albers.

Shell perforate or rimate, conic-elongated, thin, diaphanous, striatulate, variegated; whirls 6–8, rather convex; aperture ample, oblong-oval, equalling about half the shell's length, columella more or less tortuous, peristome thin, expanded, generally colored, its columellar margin reflected.

Bulimulus serperastrus, SAY.—Shell elongate, ovate, even fusiform, thin, with delicate lines of increment, yellowish-white, with about six unequal, interrupted, sometimes coalescent, bluish-black bands on the large whirl, three of which are continued on the upper whirls; whirls six or seven, slightly convex, with a fine, well-marked suture; aperture less than half the length of the shell, lunate, one-half longer than wide, rather acute at base; peristome sharp, expanded, its columellar portion widening upwards, and protecting a moderate-sized umbilical opening; columellar margin straight; the bands of the exterior reappear, in still deeper colors, in the fauces, but terminate at some distance short of the peristome, which is white, or tinted more or less rose-color. Length 31, diam. 13; aperture 15 long, 8 mill. wide.

Fig. 334.

Bulimulus serperastrus.

Bulimus serperastrus, SAY, New Harmony Diss. Dec. 30, 1830; BINNEY's ed. 39.—PFEIFFER, Mon. Hel. Viv. II, 102; III, 341; in CHEMNITZ, ed. 2, 82, pl. xxx, f. 122; pl. xxxix, f. 5 (1854).—PHILIPPI, Icon. III, 23, p. 43, tab. ix, f. 6 (1850).—REEVE, Con. Icon. no. 252.—BINNEY, Terr. Moll. II, 274, pl. 1, f. 2.—W. G. BINNEY, Terr. Moll. IV, 126.

Bulimus liebmanni, PFEIFFER, Mon. Hel. Viv. II, 106.

Bulimus ziebmanni, REEVE, Con. Icon. 506.

Fig. 335.

Bulimus nitelinus, REEVE, Con. Icon. 398.

Drymæus serperastrus, TRYON, Am. Journ. Conch. III, 167, pl. xiii, f. 14 (1867).

Bulimus serperastrus. [SAY.]

Inhabits Central America and Mexico. Has been found in Texas.

This species belongs more to the fauna of Mexico than to that of the United States, but is admitted here because it has actually been found in Texas.

More slender and elongated individuals have been described under the names of *B. liebmanni* and *ziebmanni*. The former name is withdrawn

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in the third volume of Pfeiffer's Monograph. An imperfect, smaller specimen is described as *nitelinus*. I do not agree with Dr. Gould in also placing *B. lilacinus*, Rve., in the synonymy.

The specimen figured above is from Dr. Binney's collection. Fig. 335 is copied from a drawing by Mrs. Say under which is written, in Mr. Say's handwriting, "*Bulimus serperastrus*, Mexico, *Mr. McClure.*"

In the collection of Mr. Bland is an uniformly white specimen.

Subgenus **LIOSTRACUS**, Albers.

Shell thin, perforate, oblong-conic, glabrous, most often shining, banded; whirls 7–8, aperture obliquely semioval, much smaller than one-half the shell's length; peristome thin, more or less expanded, white, its columellar margin dilated-reflexed.

Bulimulus ziegleri, Pfeiffer.—Shell subperforate, ovate-conic, thin, decussated with crowded striæ and microscopic revolving nearly obsolete lines, white, sometimes varied with interrupted bands or blotches of chestnut; spire conical, rather acute; whirls six, scarcely convex, the last subangulated at its middle, a little shorter than the spire; columella slightly receding; aperture oval; peristome simple, its columellar portion slightly reflected, subappressed. Length 21, diam. 10; of the aperture 10 long, 6 mill. broad.

Fig. 336.

Bulimulus ziegleri.

Bulimus ziegleri, Pfeiffer, Proc. Zool. Soc. 1845, 113; Mon. Hel. Viv. II, 175; III, 413; IV, 172.—Reeve, Con. Icon. 389.
Orthalicus ziegleri, Carpenter, Maz. Cat. 177.
Liostracus ziegleri, Tryon, Am. Journ. Conch. III, 168, pl. xiii, f. 6 (1867).

Mazatlan and Central America. It has not yet been found in eastern North America, and belongs more properly to the Mexican than North American fauna.

Fig. 336 is drawn from a specimen received from Dr. Pfeiffer.

Bulimulus marielinus, Poey.—Shell imperforate, ovate-conic, thin, very minutely substriate, somewhat shining, pellucid, white, varied above the middle by numerous subinterrupted, reddish-chestnut bands; spire conic, somewhat acute; whirls five, scarcely convex, the last about equalling the spire, subattenuated at base; aperture scarcely oblique, subelliptical, narrowed at base; peristome simple, straight, its columellar termination subreflected above, appressed. Length 16, diam. 8 mill.; of aperture, length 9, breadth in its centre 5.

Fig. 337.

Bulimulus marielinus.

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Bulimus marielinus, POEY, Memorias, I, 212, 447; II, pl. xii, f. 32, 33 (young).—PFEIFFER, Mon. Hel. Viv. III, 407.

Bulimus (Leptomerus) marielinus, TRYON, Am. Journ. Conch. III, 174, pl. xiv, f. 23 (1867).

A Cuban species, specimens of which were found by Dr. J. G. Cooper in southern Florida; one of them is drawn in Fig. 337.

Bulimulus floridanus, PFEIFFER.—Shell narrowly perforated, ovate-elongate, rather smooth, grayish-green, variegated with white opaque streaks and spots; spire elongate-conic, somewhat acute; whirls six and a half, rather convex, the upper ones banded with interrupted brown, the last about three-sevenths the length of the shell, subangulated below the middle, attenuated at the base; columella somewhat twisted, receding; aperture slightly oblique, oval; peristome thin, its right termination narrowly expanded, the columellar termination dilated, reflected, hardly touching the shell. Length 15½–17, diam. 7½; length of aperture 7½, diam. 4½ mill.

Fig. 338.

Bulimulus floridanus.

Bulimus floridanus, PFEIFFER, Proc. Zool. Soc. 1856, 330; Mon. Hel. Viv. IV, 406.—W. G. BINNEY, Terr. Moll. IV, 134, pl. lxxix, f. 3, not of CONRAD.

Liostracus floridanus, TRYON, Am. Journ. Conch. III, 168, pl. xiii, f. 7 (1867).

Florida.

The specific name must not be confounded with that proposed by Conrad for a fossil species (Sill. Am. Jour. [2], II, 399).

I have not seen this species. Fig. 338 is copied from drawings of the original specimen in Mr. Cuming's collection.

Fig. 339.

Bulimulus dormani.

Bulimulus dormani, W. G. BIN.—Shell perforated, rather heavy, shining, elongated-conic, white, with several regular revolving series of interrupted, perpendicular, reddish-brown patches; suture distinctly marked; apex punctured; whirls six, rather convex, marked with numerous very fine revolving lines; upper whirls striate, last whirl full, with a hardly perceptible obtuse carina at the upper extremity of the peristome. Length 29, diam. 12 mill.

Bulimus dormani, W. G. BINNEY, Proc. Acad. Nat. Sci. Philad. 1857, 188; Terr. Moll. IV, 132, pl. lxxx, f. 10.—PFEIFFER, Mal. Blat. 1859, 45.

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Liostracus dormant, TRYON, Am. Journ. Conch. III, 169, pl. xiii, f. 8 (1867).

Found at several points near St. Augustine, Florida, by Major O. M. Dorman.

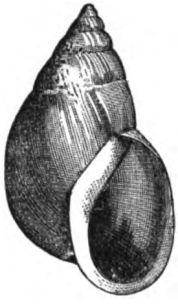
Judging from the description and figure given by Reeve, *Bulimus maculatus*, Lea, of Carthagena, New Grenada, must be nearly related to this species.

SUBGENUS **MESEMBRINUS**, Albers.

Shell rimate-perforate, conic-ovate, striated, white, variegated with red; rather solid; whirls 6–7; aperture shorter than the spire; columella subtortuous; aperture less than one-half the length, oblong ovate; peristome simple, acute, straight, its columellar termination more or less dilated, appressed, reflected.

Bulimulus pallidior, SOWERBY.—Shell rather solid, elongate ovate, white, faintly striate; spire acuminate; whirls six, convex; suture well impressed, last whirl three-fourths the length of the shell, tumid and somewhat gibbous on the back; aperture placed somewhat laterally, half the length of the shell, suboval, its plane nearly that of the axis, extremities of the peristome approximate; peristome moderately reflected at base, still less so laterally, rising broadly at the columella, and standing off from the body-whirl; umbilical opening large and deep, subcircular; fauces cream colored. Length 36, breadth nearly 25 mill.

Fig. 340.



Bulimulus vegetus.

Bulimus pallidior, SOWERBY, Proc. Zool. Soc. 1833, 72, &c.

Fig. 341.

Bulimus pallidior.

Bulimus pallidior, PFEIFFER, Mon. Hel. Viv. II, 61, &c.

Bulimus vegetus, GOULD, Bost. Journ. VI, 375, pl. xiv, f. 2 (1853).

Thaumastus pallidior, TRYON, Am. Journ. Conch. III, 170, pl. xiii, f. 9 (1867).

It seems to inhabit all the peninsula of California, having been found by Mr. Xantus at Cape San Lucas and three hundred and fifty miles above, and by others at San Juan and San Diego. It is found on high Copaiva trees. It is said to inhabit South America.

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Jaw with about thirteen separate plates, the outer longitudinal edge of each thickened into costæ; coarse transverse striæ.

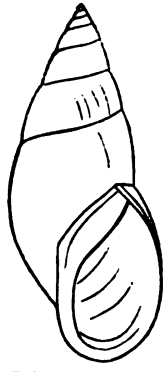
The above is Gould's description. There can be no doubt of the identity of his species with *B. pallidior*.

Fig. 340 is a fac-simile of that of Dr. Gould. Fig. 341 is from a specimen collected by Mr. Xantus.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8352	6	Cape St. Lucas, L. C.	J. Xantus.	= *B. vegetus*, Gld.
8553	6	" "	"	Cab. series.

Bulimulus excelsus, GOULD.—Shell ovate-fusiform, rather solid, smooth, pale coffee-colored, with unequal longitudinal striæ of white shading into each other, white at suture; spire acute, elongated; whirls seven, moderately convex, the last not quite two-thirds the length of the shell; aperture less than half the length of the shell, obliquely subovate, peristome soon becoming revolute, broadly so in front, rising, a little narrowed by a somewhat abrupt curve upon the columella, and expanding again as it rises, until the two extremities of the peristome nearly meet; the columellar portion stands off from the body-whirl, displaying a large umbilical fissure; peristome white, with a brown submargin at the point of reflection. Length 43, breadth 18 mill.

Fig. 342.



Bulimulus excelsus.

Inhabits California and Lower California.

This shell has very much the appearance of *B. lobbii*, Reeve, from Peru; but the aperture is larger and differently proportioned; the colors are less bright, the stripes broader and more blended. *B. pallidior*, Sowerby, has the aperture more like it, but is colorless, and has the spire less elongated. In form it is also much like *B. xanthostoma*, D'Orb. It has the form of *B. membranaceus*, but is much larger and thicker.

Bulimus excelsus, GOULD, Bost. Journ. Nat. Hist. VI, part 3, 376, pl. xiv, f. 3 (Oct. 1853).—PFEIFFER, Mon. Hel. Viv. IV, 384.—W. G. BINNEY, Terr. Moll. IV, 24, pl. lxxix, f. 12.

Bulimus elatus, GOULD, *l. c.* in tab.

Thaumastus excelsus, TRYON, Am. Journ. Conch. III, 171, pl. xiii, f. 10 (1867).

I have copied the original description of this species.

Fig. 342 is an outline of the original figure.

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Bulimulus inscendens, W. G. Binn.—Shell rimate, acuminately oblong, thin, reddish-brown, decussated with striæ of growth and minute revolving lines, the apical whirl and a half being ribbed; suture moderate; whirls seven, convex, the last seven-twelfths the shell's length; aperture oblique, oblong-ovate; peristome simple, acute, reflected at the columella; a thin callus on the parietal wall of the aperture. Length 36, breadth 10; aperture 15 long, 9 mill. broad.

Fig. 343.

Bulimulus inscendens.

Bulimus inscendens, W. G. Binney, Proc. Acad. Nat. Sci. Philad. 1861, 332 (fig.).

Mesembrinus inscendens, Tryon, Am. Journ. Conch. III, 170, pl. xiv, f. 21 (1867).

On dry mountains, 800 to 1000 feet high, between Cape San Lucas and Margarita Bay, Lower California, and some three hundred and fifty miles above (*Xantus*), climbing high Copal trees; never found on the low lands or table-lands.

The description is drawn from the most perfect specimen, which is somewhat smaller and more cylindrical than some of the others. On first receiving a single specimen, I was inclined to refer it to *B. excelsus,* Gld. A careful examination of the description of that species, however, and of a specimen lately received, convinces me of its being distinct. Its peculiar characteristic is the strongly ribbed, polished apical whirls, differing from the decussated sculpturing of the remainder of the shell.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9107	1	Lower California.	J. Xantus.	Type.
8865	2	Cape St. Lucas.	"	.....

Bulimulus multilineatus, Say.—Shell subperforate, thin and strong, elongated, ovate-acuminate, smooth and shining, of a bright yellowish-white color, variegated with longitudinal stripes and spiral zones of dark chestnut, of various widths, none of which are constant except a subsutural line, continued to the apex, which is also black; whirls about seven, a little convex; suture delicate; aperture rounded-ovate, a little more than one-third the length of the shell; peristome acute; columella straight, widening upwards, and protecting a minute umbilical opening. Length 25, diam. 10 mill.

Fig. 344.

Bulimulus multilineatus.

Bulimus multilineatus, Say, Journ. Acad. Nat. Sci. Philad.

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V, 120 (1825); ed. BINNEY, 28.—DEKAY, N. Y. Moll. 56 (1843).—W. G. BINNEY, Terr. Moll. IV, 132.—PFEIFFER, Mon. Hel. Viv. II, 204.

Bulimus menkei, GRUNER, Wiegm. Archiv. 1841, I, 277, pl. xi, f. 2.—PFEIFFER, Mon. Hel. Viv. II, 176.

Bulimus venosus, REEVE, Con. Icon. pl. xlv, f. 285 (1848).

Bulimus virgulatus, BINNEY, not FERUSSAC, Terr. Moll. II, 278, pl. lviii.—LEIDY, T. M. U. S. I, 259, pl. xv, f. 7–8 (1851), anat.—PFEIFFER, *l. c.* IV.

Mesembrinus multilineatus, TRYON, Am. Journ. Conch. III, 169, pl. xiii, f. 11, 12 (1867).

Key West and Lower Matacumba Key, Florida. St. Martha, New Granada. Maracaibo and Porto Cabello, Venezuela (cabinet of Mr. Swift).

There is considerable confusion regarding the synonymy of this shell. An immature specimen from Florida was first described by Mr. Say as *Bulimus multilineatus*. It was not again met with until Dr. Binney received specimens from his collector in Florida. From these shells it was described and figured in the Terrestrial Mollusks. Its identity with Mr. Say's species was there recognized, but as *B. multilineatus* was considered a synonym of the West Indian *Bulimus virgulatus*,[1] our shell was placed under that name. In the fourth volume of the Terrestrial Mollusks I restored to the species the original name of *multilineatus*. Among European authors the name is mentioned only by Pfeiffer (Mon. II, 204) as a species unknown to him, and later (IV, 482) as a synonym of *Bul. elongatus*. The last quotation was probably influenced by the treatment of the species in the Terrestrial Mollusks, as he also quotes in the same synonymy the description and figure of that work. It appears to me that Dr. Pfeiffer has described the species from specimens from the Orinoco, under the name of *Bulimus menkei*. While criticizing the plates of the Terrestrial Mollusks (Mal. Blatt. 1859, p. 29) he notices the resemblance of the upper figure to *Bul. menkei* in color.

The name *Bulimus venosus* of Reeve was suggested for the specimens from the banks of the Orinoco, on account of *Bulimus menkeanus* of Ferussac preventing the use of the name *Bul. menkei*.

Specimens resembling those from Florida have been received from Venezuela by Mr. Swift. There can be no doubt of the

[1] This is now recognized as a synonym of *B. elongatus*, Bolt.

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species having several times been found in Florida as well as in South America.

I add below the descriptions of Say and Pfeiffer.

Bulimus multilineatus.—Shell conic, not very obviously wrinkled; whirls not very convex, yellowish-white, with transverse entire reddish-brown lines; a blackish subsutural revolving line; suture not deeply indented, lineolar; apex blackish; umbilicus small, surrounded by a broad blackish line; columella whitish; labrum simple, blackish. Length less than seven-tenths of an inch; greatest breadth less than seven-twentieths of an inch. This species was found by Mr. Titian Peale on the southern part of East Florida. (*Say.*)

Bulimus menkei.—Shell subperforated, oblong-acute, thin, smooth, white with three bands (two confluent, one sutural) and streaks of chestnut; whirls seven, rather convex, the last about equalling two-fifths the shell's length; columella obliquely receding; aperture oval-oblong; peristome simple, acute, black, its columellar termination dilated, arcuately reflected, appressed. Length 21, diam. 9; aperture 9 long, 4½ wide. Near Orinoco, Venezuela. (*Pfeiffer.*)

A study of these descriptions will, I believe, convince one of the identity of the Florida and Orinoco shells with *Bulimus multilineatus*. There can be no doubt that the well-known *Bul. elongatus* is quite a distinct species.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8705	2	Lower Matacumba Key, [Fla.	G. Wurdemann.	Cab. series.

Subgenus **THAUMASTUS**, Albers.

Shell imperforate or rimate, conic-oblong, striate, white, streaked with brown; aperture oblong-oval, generally not equalling a half the shell's length; columella distinctly tortuous, often colored; peristome obtuse, straight, or briefly expanded, its columellar margin reflexed, more or less appressed.

Fig. 345.

Bulimulus californicus, enlarged one-half.

Bulimulus californicus, Reeve.—Shell somewhat acuminately ovate, rather thin, scarcely umbilicated; whirls six in number, smooth; columella reflected, lip simple; cream color, encircled with interrupted transverse blue black zones. (*Reeve.*)

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Bulimus californicus, Reeve, Con. Icon. 378.—Pfeiffer, Mon. Hel. Viv. III, 422.—W. G. Binney, Terr. Moll. IV, 21, pl. lxxix, f. 15.

Thaumastus californicus, Tryon, Am. Journ. Conch. III, 170, pl. xiii, f. 14 (1867).

California.

I have not seen this species. Fig. 345 is copied from Reeve. I do not agree with Dr. Gould (Terr. Moll. II, 275) in referring the species to *Bulimus serperastrus*, Say.

Bulimulus patriarcha, W. G. Binn.—Shell perforate, ovate, heavy, white, and wrinkled; whirls six, convex, the last ventricose, equalling in length five-sevenths of the shell; aperture ovate; peristome simple, thickened within, the extremities joined by a heavy white callus, the columellar extremity slightly reflected, so as partially to conceal the umbilicus. Length 35, diam. 19; aperture, length 19, diam. 12 mill.

Fig. 346.

Bulimulus patriarcha.

Bulimus patriarcha, W. G. Binney, Proc. Acad. Nat. Sci. Philad. 1858, 116; Terr. Moll. IV, 130, pl. lxxx, f. 13.—Pfeiffer, Mal. Blat. 1859, 48.

Thaumastus patriarcha, Tryon, Am. Journ. Conch. III, 171, pl. xiii, f. 15 (1867).

Texas. Mexico, at Buena Vista. (*Berlandière.*)

Named from its greater size and more antiquated appearance, as compared with the allied species, but the young individuals are as readily distinguished as the most mature from any other. It is most nearly related to *B. schiedeanus*, but differs from that species in having a shorter, more rapidly acuminated spire, longer and much more globose body-whirl, more lengthened and narrower aperture, and rougher surface.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8713	2	Buena Vista.	Lieut. Couch.	Type. Cab. series.

Bulimulus alternatus, Say.—Ovate conic, with alternate gray and brownish longitudinal vittæ. Inhabits Mexico. Shell umbilicated, ovate-conic, with longitudinal lines, subequal, gray and light brownish vittæ; the brown is paler, almost approaching in some instances a drab; the white vittæ consist of more or less confluent, transverse, irregular lines, and small spots; whirls about six, a little convex; suture not profoundly impressed; labrum (in some specimens) with a thickened line or rib on the

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inner submargin, within white, with a perlaceous tinge. Length one and one-fifth of an inch. Greatest breadth seven-tenths. This species appears to be not uncommon in Mexico, as many specimens were sent me by Mr. Maclure; but from what particular locality, I know not. (*Say.*)

Fig. 347.

Bulimus alternatus. [SAY.]

Bulimus alternatus, SAY, New Harmony Diss. Dec. 30, 1830; Descr. 25; ed. BINNEY, 39.—PFEIFFER, Mon. Hel. Viv. II, 221.—W. G. BINNEY, Terr. Moll. IV, 126, pl. lxxx, f. 1, 3, 18.

Bulimus dealbatus, BINNEY, part, Terr. Moll. II, 276, pl. li a, upper and lower fig., pl. li b.—Not SAY

Bulimus mariæ, ALBERS, Heliceen, 162.—PFEIFFER, Proc. Zool. Soc. 1858, 23; Mon. Hel. Viv. III, 350; in CHEMNITZ, ed. 2, 157, pl. xlviii, f. 7, 8.—W. G. BINNEY, Terr. Moll. IV, 128.

Bulimus binneyanus, W. G. BINNEY, Ter. Moll. IV, 128.—Not PFEIFFER.

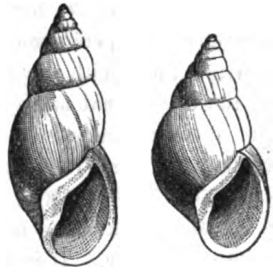
Thaumastus alternatus, TRYON, Am. Journ. Conch. III, 171, pl. xiii, f. 16; pl. xiv, f. 10, excl. f. 12 (1867).

Thaumastus mariæ, TRYON, Am. Journ. Conch. III, 172, pl. xiv, f. 3, 4, 5 (1867).

From Louisiana through Texas into Mexico.[1] It belongs rather to the fauna of Mexico. Found in great numbers upon bushes, the ground below them being often covered with dead shells.

This species is readily distinguished from the allied forms by its greater solidity, its highly polished surface, its more elongated form, its dark colored aperture, bordered with the white internal margin of the peritreme, and the tooth-like callus upon the upper portion of the columella. It varies considerably in form, being sometimes quite slender, at others quite globose. In color it shows every variation from uniform brownish to pure white. The aperture, however, is always dark, and has a white, thickened rim within the peristome. It is most attractive when ornamented with alternate white and brown longitudinal blotches.

Fig. 348.



Bulimulus alternatus.

[1] Forbes (Proc. Zool. Soc. 1850, 54) mentions a *Bulimus alternatus* from Panama.

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There can, I believe, be no doubt that the shell under consideration is what Mr. Say described as *alternatus*. This description is given above, and a copy (Fig. 347) of a colored drawing by Mrs. Say, under which is written, in Mr. Say's hand, "*Bulimus alternatus*, Mexico, Wm. Maclure."

The species was known to Dr. Binney and figured in the Terrestrial Mollusks, but as a variety of *B. dealbatus*. Plate 51 b, and the upper and lower figures of plate 51 a certainly represent the species. The central figures of plate 51 a represent a variety of *B. dealbatus* (*q. v.*), as does also, I should judge, figure 2 of plate 51,[1] though the last may be *B. schiedeanus*.

In vol. 4 of Terrestrial Mollusks I took the same view of *Bul. alternatus* as at present, having the original figure of Mr. Say to assist in determining the species (pl. 80, f. 3). I figured (pl. 80, f. 1) a specimen on which a dark brown color is but slightly broken by white upon the upper whirls. Fig. 15 of the same plate should be also referred to *B. alternatus*. On account of the lesser development of the columellar fold I erroneously referred it to *B. schiedeanus*. On p. 128 I repeated Pfeiffer's description of *Bulimus mariæ*. I had seen no specimen, and admitted the species only temporarily, observing that it must be nearly allied, if not identical with *B. alternatus*. Since that time I have received authentic specimens, and have learnt that *Bul. mariæ* was described from specimens similar to those I have considered as *Bul. alternatus*. While preparing the fourth volume of the Terrestrial Mollusks for publication I sent to Dr. Pfeiffer for identification specimens like those figured on plate 51 b. He returned them with the name *B. binneyanus*. This will account for the use of that name on p. 128. I have subsequently learnt that, deciding the specimens sent to be a variety of *B. mariæ*, he applied the name *B. binneyanus* to quite another species (Proc. Zool. Soc. 1858, pl. xlii, f. 4).

Pfeiffer gives Say's description of *B. alternatus* as a species unknown to him. It is not mentioned by other authors.

Bulimus mariæ, Albers, is referred to *alternatus* from the description, given below, of Albers and Pfeiffer,[2] from the figure

[1] In the explanation of the plates in vol. III, Dr. Gould refers plate 51 b to *Bul. schiedeanus*, pl. 51 a to *lactarius*, and fig. 2 of 51 to *alternatus*.

[2] Plate 51 b of Terr. Moll. is referred by Pfeiffer to a form of *B. mariæ*, pl. 51 a to *lactarius*, which he says may be *alternatus*, and pl. 50, fig. 2 to *schiedeanus*.

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in the second edition of Chemnitz, and from authentic specimens in my collection.

Bulimus mariæ.—Shell perforate, ovate pyramidal, striatulate, shining, white, varied irregularly with diaphanous bands and spaced blotches; whirls six and a half, convex, joined by a deep suture, the last a little shorter than the spire; columella somewhat constricted, strongly tuberculate above; aperture oblong-oval, smoky within; peristome whitely labiate within, broadly expanded, its columellar margin reflexed, patent. Length 30, diam. 12; of aperture, length 12, interior breadth 7 mill. *Hab.*—. (*Albers.*)

Fig. 349 represents a common form of *Bulimus mariæ.*[1]

Fig. 349.

Bulimulus mariæ.

Dr. Pfeiffer's description of *B. mariæ* is as follows:—

Shell narrowly umbilicated, oblong-conic, solid, rather smooth, white, often marked with spots and obsolete blotches of horn-color; spire conic, acute; whirls six and a half, rather convex, the last about as long as the spire, hardly attenuated at base; columella with a small denti-form fold; aperture scarcely oblique, acuminately-oblong, brownish within; peristome straight, its right margin somewhat arched, its columellar margin broadened above, spreading. Length 33, diam. 14–15 mill.; of aperture, length 16–17, breadth 7½.

Fig. 350.

Bulimulus alternatus.

One of the uniformly white forms of the species is figured in Fig. 350, and two of the same from the table-land west of Fort Clark, figured in Fig. 348, show the variation in breadth of which the species is capable.

There are about seventy-six rows of teeth on the lingual membrane of *B. alternatus*, each consisting of 75 (37—1—37) teeth. Central teeth long, simple, bluntly pointed, the laterals bicuspid, modified as they pass off laterally.

Fig. 351.

Lingual dentition of *Bulimulus alternatus.*

[1] The figure being in outline is unshaded in the aperture, which in the original is dark brown.

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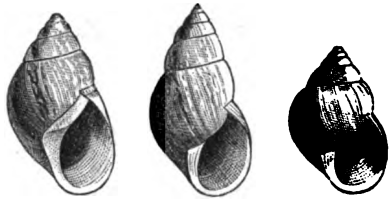
Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8420	14	Tamaulipas, Mex.	Lieut. Couch.	.....
8421	2	Matamoras, Mex.	"	.....
8692	4	Tamaulipas, Mex.	"	Cab. series.
8982		Leon.	Lieut. Beale.	.....
8430	8	San Pedro.	.....	.....
8686	3	Texas.	Lieut. Couch.	.....

Bulimulus schiedeanus, PFEIFFER.—Shell perforated, ovate-acute, calcareous, white, with irregular longitudinal wrinkle-like striæ; whirls six and a half, rather convex, the last as long as the spire; aperture oval-oblong, brownish within; columella obsoletely folded; peristome simple, acute, its margins joined with a shining callus, the columellar one broadly reflected, white and shining. Length 31, diam. 17 mill.; length of aperture 17, breadth 9.

Fig. 352.



Bulimulus schiedeanus.

Bulimus schiedeanus, PFEIFFER, Symb. ad Hel. Hist. I, 43; Mon. Hel. Viv.[1] II, 187; in CHEMNITZ, ed. 2, no. 216, pl. xlvi, f. 3, 4 (1854).—PHILIPPI, Icon. I, 3, p. 56, pl. 1, f. 12 (1843).—REEVE, Con. Icon. no. 361.—W. G. BINNEY, Terr. Moll. IV, 129.

Bulimus alternatus, BINNEY, Terr. Moll. pl. li, f. 2.—Not of SAY.

Thaumastus schiedeanus, TRYON, Am. Journ. Conch. III, 172, pl. xiv, f. 12 (1867)

Texas and the neighboring part of Mexico. Very common in Washington County, Texas.

From *Bulimulus alternatus* this species is distinguished by a rougher surface, a light-colored aperture, a shorter and more pyramidal spire, and by the want of the highly developed tooth-like fold upon the columella. It is of a dead white color, not variegated with brown blotches. The aperture is shorter and wider, and there is no strong internal white thickening to the peritreme. Like all the species of the group it has a highly polished very light waxen apex. There are sometimes light delicate waxen vittæ upon the first two whirls.

No description of this species was given by Dr. Binney, nor was it figured unless in plate 51, fig. 2, as *B. dealbatus,* var. On p. 278 of vol. 2, Dr. Gould erroneously refers to it pl. 51 b.

[1] Pfeiffer quotes also as synonyms the manuscript names *B. xanthostomus,* Wiegm., and *B. candidissimus,* Nyst.

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There is a great difference in the comparative globoseness of the various specimens.

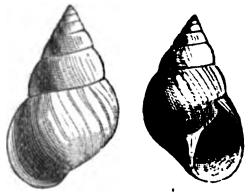
The shell figured as a variety of *B. schiedeanus* with a dark colored aperture in the fourth volume of the Terrestrial Mollusks (pl. 80, f. 15) is rather a specimen of *Bul. alternatus*, in which the columellar fold is not as strongly developed as usual. Fig. 8 of the same plate I describe below as variety *mooreanus*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8427	19	Tamaulipas, Mex.	.....	.....
8428	16	.....	.....	.....
8429	1	Texas.	G. Wurdemann.	.....
8683	4	Washington Co., Texas.	W. G. Binney.	.....
8807	20+	Texas.	"	Cab. series.
9157	1	Cienaga Grande.	.....	.....

Variety **mooreanus.**— Shell perforated, ovate-conic, thin, white, with a dark lead-colored apex, and below the middle of the body-whirl of a light coffee color; smooth, with microscopic revolving lines: whirls seven, convex, the last equalling about two-thirds the shell's length; aperture ovate, light within, columella straight; peristome acute, very thin, with an internal delicate white rim, its margins unconnected with callus, that of the columella broad, white, slightly reflected. Length 25, breadth 12 mill.

Bulimus schiedeanus, var., W. G. Binney, Terr. Moll. IV, 129, pl. lxxx, f. 8.

Fig. 353.



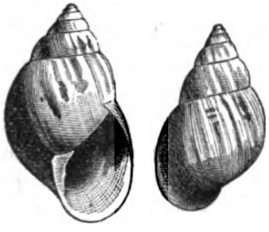
Bulimulus mooreanus.

Found in large numbers in Washington and DeWitt Counties, Texas, by Dr. F. W. Moore, and at Leon by Lieut. Beale.

Fig. 354.

Bulimulus mooreanus.

Fig. 355.



Bulimulus mooreanus, var.

It is a more fragile, highly polished shell than *B. schiedeanus*, and is peculiar in having the dark apex and the body-whirl light coffee-colored below the upper margin of the aperture. In one case only have I observed the whole shell of this color, it was then of a darker hue. There is an extremely light, transparent callus on the parietal wall of the aperture.

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To this variety also are to be referred specimens having delicate longitudinal light wax-colored patches.

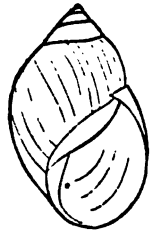
Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8687	3	Texas, Washington Co.	Dr. F. W. Moore.	.....

SUBGENUS **MORMUS**, Albers.

Shell rimate, oblong-conic, striate or costulate, thin, white, often variegated with brownish; whirls 6–7, the upper ones somewhat flattened, the last rather tumid; aperture equalling about half the shell's length, subovate; peristome simple, straight, its columellar margin dilated, reflected.

Bulimulus sufflatus, GOULD.—Shell ovoid, thin, milk white, delicately and regularly striate; spire short; whirls five and a half, inflated, the last one more than three-fourths the length of the shell, nearly symmetrical in form at both extremities; aperture somewhat more than half the length of the shell, narrow lunate; lip simple; columella broadly reflected over a narrow umbilical fissure; a thin glazing of callus on left lip. Length 1¼, breadth seven-tenth inch.

Fig. 356.



Bulimulus sufflatus. [GOULD.]

Inhabits Lower California. (*Gould.*)

Bulimus vesicalis, GOULD, Bost. Journ. Nat. Hist. VI, 375, pl. xiv, f. 1 (1853).—PFEIFFER, Mon. Hel. Viv. IV, 467.—GABB, Am. Journ. Conch. III, 237, pl. xvi, f. 6 (1867).

Bulimus sufflatus, GOULD in litt.—W. G. BINNEY, Terr. Moll. IV, 25.—PFEIFFER, Mal. Blatt. 1859, 45.

Mormus sufflatus, TRYON, Am. Journ. Conch. III, 172, pl. xiv, f. 6 (1867).

An outline of Dr. Gould's figure is given above. Specimens lately collected by Dr. Gabb from La Paz are quite solid, and have a thickened peristome.

Fig. 357.

Bulimulus pilula.

Bulimulus pilula, W. G. BINNEY.—Shell globose, inflated, umbilicated, thin, with longitudinal wrinkles, chalk-colored; apex obtuse; whirls four, convex, the last very inflated, equalling ten-elevenths the length of the whole shell; columella simple, arched; aperture oblique, rounded; peristome simple, acute, its columellar end expanded so as partially to cover the umbilicus. Length 22, breadth 7; of aperture, length 9, breadth 6 mill.

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Bulimus pilula, W. G. Binney, Proc. Acad. Nat. Sci. Phila. 1861, 331 (fig.).
Mormus pilula, Tryon, Am. Journ. Conch. III, 173, pl. xiv, f. 7 (1867).

Lower California, at Todos Santos Mission and Marguerita Island. (*Xantus.*)

Mr. Xantus found many of this species during his stay on the peninsula, and is decidedly of the opinion that maturer specimens, if any existed, would have been noticed by him. It frequents rocky spots, living under mosses.

"I can find no figure in Reeves' Monograph or description in Pfeiffer's works of any species at all approaching it in shape. The measurements are taken from the largest individual. All the specimens are uniform in outline and other respects.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9019	3	Todos Mission.	J. Xantus.	Type.

Subgenus **SCUTALUS**, Albers.

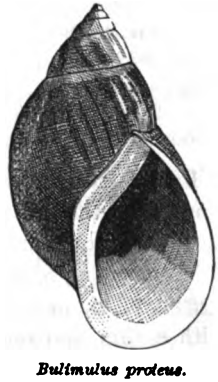
Shell perforate or umbilicate, ovate-conic, regularly striate, rough, brownish-white, usually variegated; whirls 4–7, the last ventricose, more or less accurately equalling the spire, compressed at the base; aperture oblong-ovate, peristome more or less expanded, often reflexed, lightly thickened within.

Bulimulus proteus, Broderip.—Shell umbilicated, ovate-conic, thin, crowdedly granulated and striate, dull white, varied with smoke color; whirls six, rather convex, the last equalling the spire; umbilicus rather large, pervious; aperture suboval; peristome thin, acute, broadly expanded, its ends converging, the columellar portion very broad, flat, effuse. Length 40, diam. 19; of aperture 19 long, 10 mill. wide, within.

Bulimus proteus, Broderip, Proc. Zool. Soc. London, 1832, 107.—Pfeiffer, Mon. Hel. Viv. II, 61 (which see for further synonyms).—W. G. Binney, Proc. Acad. Nat. Sci. Philad. 1861, 331.

Bulimus sordidus, Lamarck,[1] not Lesson, teste Pfr.

Fig. 358.



Bulimulus proteus.

Scutalus proteus, Tryon, Am. Journ. Conch. III, 173, pl. xiv, f. 8 (1867).

[1] *B. proteus*, Guild. = *B. elongatus.*

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Cape St. Lucas. (*Xantus*). No. 8564 of the collection agrees perfectly with the figure given by Deshayes and Ferussac, pl. 133, f. 1, 2. The bands of coloring are longitudinal in this specimen, and not transverse as in Reeve's figure. Numerous young shells were also collected by Mr. Xantus. Pfeiffer gives the mountains of Peru as habitat of the species. It is also quoted from Campaña de Quillota, Chili.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8564	1	Cape St. Lucas, Cal.	J. Xantus.	Cab. series.

Bulimulus dealbatus, SAY.—Shell umbilicated, ovate-conical, or rather ventricose, thin, white, with longitudinal lines and blotches of ash; suture impressed; whirls six to seven, ventricose, acuminate, the last equalling the spire; aperture oval; peristome acute, rarely a little thickened within, somewhat reflected at its columellar portion, and partially hiding the umbilicus. Length of axis 18 mill., diam. 12 mill.

Fig. 359.

Bulimulus dealbatus.

Helix dealbata, SAY, Journ. Phila. Acad. II, 159 (1821); ed. BINNEY, 20.

Bulimus dealbatus, POTIEZ & MICHAUD, Galerie, I, 139, pl. xiii, f. 3, 4.—PHILIPPI, Icon. I, p. 158, pl. ii, f. 6 (1844).—PFEIFFER, Mon. Hel. Viv. II, 187; in CHEMNITZ, ed. 2, p. 55.—REEVE, Con. Icon. f. 455.—BINNEY, Terr. Moll. II, 276, pl. li, f. 1; pl. li a, excepting upper and lower fig. ?.—W. G. BINNEY, Terr. Moll. IV, 130, pl. lxxx, f. 6, 7.

Bulimus confinis, REEVE, Con. Icon. 643 (1850).—PFEIFFER, Mon. Hel. Viv. III, 341.

Bulimus liquabilis, REEVE, Con. Icon. 387.

Bulimus lactarius, MENKE in PFEIFFER,[1] Mon. II, 187.—REEVE, Con. Icon. 217.—GOULD, Terr. Moll. III, 35.

Scutalus dealbatus, TRYON, Am. Journ. Conch. III, 173, pl. xiv, f. 9 (1867).

Found from North Carolina to Missouri and Texas. Very common in Central Alabama, where immense beds of semifossilized shells are found, several feet below the surface.

This species, when found in Northern Alabama, is about three-fourths of an inch in length, is quite thin, almost transparent, with a thin peritreme. In more southern localities its size is greater, its shell thicker, its coloring richer, and within the

[1] Pfeiffer quotes as synonym the unpublished name of *Bulimus galeottii*, NYST.

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aperture the peritreme is margined with a broad white callus. Under such circumstances it bears considerable resemblance to *B. alternatus*, but the interior of the aperture never has the dark coloring of that species, nor is the columella furnished with the tooth-like fold. It is especially in Texas that it is found in such perfection. I have no doubt that the specimens figured on pl. 51 a of the Terrestrial Mollusks came from that State.

It is this last described form of the species which has been called *Bulimus lactarius*. I have seen no authentic specimen, but from Pfeiffer's description (see Terr. Moll. IV, 128), and his reference to all but the lower figure of plate 51 a (Mon. IV, 476), there remains no doubt of the identity of the two.

The variation in the globoseness of the whirls, and consequent outline of the shell, may be judged from the following measurements of two specimens: diam. 18, length 25; diam. 7, length 19 mill.

Of *Bulimus liquabilis* and *confinis* I have given the original description and a fac-simile of the original figures in the fourth volume of the Terrestrial Mollusks.

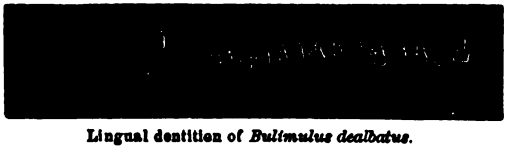
Fig. 360.

Jaw of *Bulimulus dealbatus.*

The jaw of *Bulimulus alternatus* is narrow, strongly arched, with distant anterior ribs, denticulating the concave margin. It does not agree with the description of the jaw of the subfamily *Orthalicinæ* (p. 212).

The lingual membrane consists of 94 rows of teeth, 25—1—25 in each row. Central teeth long, tricuspid, laterals bicuspid, the cusps modified as the teeth pass off laterally.

Fig. 361.



Lingual dentition of *Bulimulus dealbatus.*

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8425	5	Dallas County, Ala.	.....	.....
8426	3	Texas.	Dr. B. F. Shumard.	.....
8669	4	Alabama.	W. G. Binney.	Cab. series.
8690		Texas.	Lieut. Couch.	"
8956		Hot Springs, Ark.	Dr. B. Powell.	.....
8979		San Felipe Spr.	Lieut. Beale.	.....
8983		Leon.	"	.....

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Bulimulus xantusi, W. G. Binney.—Shell rimate, oblong-ovate, chalky-white, marked with numerous longitudinal wavy striæ and decussating minute revolving lines; suture impressed; whirls five and a half, convex, the last five-sevenths the length of the shell; columella arched; aperture oblique, oval; peristome simple, sharp, its ends somewhat approaching, that of the columella reflected; the parietal wall of the aperture covered with a light callus. Length 21 mill., breadth 8; of aperture, length 10, breadth 6.

Fig. 362.

Bulimulus xantusi.

Bulimus xantusi, W. G. Binney, Proc. Acad. Nat. Sci. Philad. 1861, 331 (fig.).

Scutalus xantusi, Tryon, Am. Journ. Conch. III, 173, pl. xiv, f. 9 (1867).

Cape San Lucas, Lower California. Mr. Xantus collected four specimens agreeing in size and other characteristics. The peculiar wavy striæ and minute revolving lines are its especial characteristics.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9018	1	Cape St. Lucas.	Xantus.	Type.

Subgenus **PERONÆUS**, Albers.

Shell perforated, oblong-turreted or subulate; white, generally streaked with horn-color; whirls 8–11, convex, the last equalling about one-third the shell's length; aperture oblong or oval, columella receding or obsoletely arcuated; peristome expanded, not thickened, its columellar margin dilated, patent.

Bulimulus artemisia, W. G. Binn.—Shell rimate, subcylindrical, broadest at the second whirl, from which it gradually tapers towards the apex, which is obtuse, its first whirl and a half being bulbous, and marked by numerous strong longitudinal ribs, white, nearly transparent, the longitudinal wrinkles of growth scarcely roughening the almost smooth surface; suture distinct; whirls eight, flattened, regularly and gradually increasing, the last equalling one-half the whole length of the shell; aperture oblique, oval; peristome simple, hardly thickened, its terminations approached, and made continuous by a white, upright callus, the columellar portion expanded. 23 mill. long, 6 wide; aperture 7 long.

Fig. 363.

Bulimulus artemisia.

Bulimus artemisia, W. G. Binney, Proc. Acad. Nat. Sci. Philad. 1861, 331 (fig.).

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Peronæus artemisia, Tryon, Am. Journ. Conch. III, 174, pl. xiv, f. 22 (1867).

But one specimen was found on a small species of *Artemisia*, at Cape San Lucas, Lower California, by Mr. J. Xantus.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9017	1	Cape St. Lucas.	J. Xantus.	Type.

Spurious Species of Bulimulus, &c.

Bulimus radiatus, Lamarck, is attributed to the western prairies in Wheatley's Catalogue of U. S. Shells, 21.

Bulimus neglectus, Pfr., has been erroneously referred to Texas (Mart. & Alb. Helic. 188).

Bulimus acutus, Müller, is quoted, without description, from N. A. by Forbes (Br. Ass. Rep. 1840, 145). See also Bost. Journ. Nat. Hist. III. 409.

Bulimus octona, Brug., has been found in greenhouses and gardens, where it has been introduced on plants.

Bulimus exiguus, Binn., is the same as *Carychium exiguum*.

Bulimus fasciatus, Binn., is the same as *Achatina fasciata*.

Bulimus gossei, Pfr., *vid. Macroceramus kieneri*, Pfr.

Bulimus kieneri, Pfr., *vid. Macroceramus kieneri*.

Bulimus lubricus, Ad. &c., is the same as *Zua lubrica*.

Bulimus obscurus, Dr., *vid. Pupa placida*, Say.

Bulimus striatus, Brug., is the same as *Glandina truncata*.

Bulimus vexillum, Brug., is the same as *Achatina fasciata*.

Bulimus vermetus, Anthony, is unknown to me. He thus describes it (Cover of Haldeman's Monograph No. 3, July, 1841): Shell turriculated, livid brown; whirls five, striated longitudinally; suture deeply indented; apex entire; body-whirl a little more than equal to the spire; spire two and a half times the length of the aperture; length 3, width 1½ lines; aperture obliquely ovate; length of the aperture equal to the width of the body-whirl. Ohio, near Cincinnati.

Distinguished by its peculiar mouth, which is curved in a regular curve from right to left, contracted at the upper angle, and spreading below; the whirls are also very deeply indented, and twisted as they are in *Succinea vermeta*.

Bulimus mexicanus, Lamarck, and

Bulimus humboldti, Reeve, have been doubtfully referred to Mazatlan.

Bulimus laurentii, Sowerby, Sitka, is, I presume, from Sitcha, San Salvador, not from the northwest coast (see Terr. Moll. U. S. IV, 25).

Bulimus acicula, Müll., T. M. IV, 137, *vide Acicula acicula*.

Bulimus marginatus, W. G. Binn. = *Pupa fallax*.

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Bulimus modicus, W. G. BINN. = *Pupa modica.*
Bulimus chordatus, PFR. = *Pupa chordata.*
Bulimus decollatus and *B. mutilatus*, SAY = *Stenogyra decollata.*
Bulimus subulus, W. G. BINN. = *Stenogyra subula.*
Bulimus gracilimus, W. G. BINN. = *Stenogyra gracillima.*
Bulimus harpa, BINN. = *Helix harpa.*
Bulimus carinatus, BRUG., Encycl. Méth. I, 301 (1792); Bosc, IV, 89 (*Buccinum*, LISTER & PETIVER), is an exotic Melanian, not inhabiting Virginia.
Bulimus urceus, BRUG., Encycl. Méth. I, 298 (1792), from Mississippi River = *Ampullaria*, *q. v.*
Melania striata, PERRY, Conch. pl. xxix, f. 5, "New California," is *Bulimus melania*, FERUSSAC.

FOSSIL SPECIES OF BULIMULUS, &C.

Bulimus limneiformis, MEEK & HAYDEN, Proc. Acad. Nat. Sci. Philad. 1860, 431 = *B. nebrascensis*, *l. c.*
Bulimus floridanus, CONRAD, Sill. Am. Journ. Sc. [2], II, 399.
Bulimus perversus, MEEK & HAYDEN = *Clausilia contraria*, M. & H.

SUBFAMILY ORTHALICINÆ.

Jaw composed of numerous separate plates. Teeth of the lingual ribbon uniform, short, bicuspid.[1]

ACHATINA, LAM.

Shell oblong, aperture longitudinal or oval, angulated above; columella truncated towards the base of the aperture; peristome simple, acute.

Fig. 364.

Jaw of *Achatina virginea.*

Jaw composite.

Lingual membrane very broad with numerous similar stout teeth, apex recurved; central teeth long, narrow, simple.

SUBGENUS LIGUUS, Montf.

Shell imperforate, solid, elongate-conic, apex acuminated, variously fasciated; whirls 7–8, the last equalling about one-

[1] The lingual ribbon of *Orthalicus undatus*, as figured below, and *Achatina fasciata* do not agree with this description.

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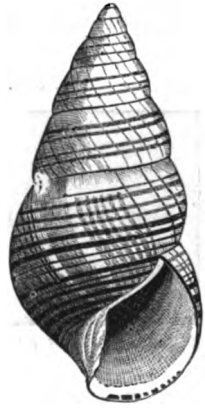
third the shell's length; columellar constricted, distinctly truncate in adult individuals; aperture lunate-oval, subangulated; peristome straight, acute, its margins joined by an entering callus.

Animal (of *A. fasciata*) dark brown, or chocolate color, over the whole body; surface very prominently granulated; eye-peduncles very long when extended, thick at their base, ocular points black and small; tentacles long, conical, rounded at the extremities; collar lead-color; extremity of foot usually rounded; when in motion, the whole foot glides smoothly forward, without any perceptible alternate motion of the margins.

Achatina fasciata, Müller.—Shell imperforate, conical, rather thick, smooth, shining, minutely striated; whirls seven to eight, convex, decreasing in diameter gradually and regularly from the body-whirl to the apex; suture impressed; apex obtuse, commonly white, sometimes rosy; aperture suboval, purely white internally, sometimes with a thickened ridge within, and parallel to the peristome; peristome acute, sometimes crenate; columellar margin with a thin callus, sometimes rosy; columella subtruncate in the young, entire in the mature shell, imperforate; surface beautifully variegated with broad, entire or interrupted bands, lines, and spots of brown, with bands and lines of green and yellow, and with lines of rufous, revolving upon the whirls from the apex to the aperture, but more distinct upon the outer whirls; a single system of coloring prevails in some shells, while in others there is a mingling of all of them upon the same specimen. Extreme length 53, diam. 23 mill.

Fig. 365.



Achatina fasciata.

Buccinum fasciatum, Müller, Verm. II, 145 (1774).
Bulla fasciata, Chemnitz, Conch. IX, t. cvii, f. 1004–1006.
Bulimus vexillum, Bruguières, Encycl. Méth. no. 107.
Helix vexillum, Férussac, Hist. pl. cxxi.
Achatina vexillum, Lamarck, An. s. Vert. 2d ed. VIII, 298.—Not of Dekay.
Achatina crenata, Swainson, Illust. pl. lviii.
Achatina pallida, Swainson, Ill. pl. xli.
Achatina fasciata, Swainson, Ill. pl. clxii.—Reeve, Conch. Syst. II, f. 12.—D'Orbigny, Moll. Cub. I, 172, pl. vi, f. 1–7.—Pfeiffer, Mon. Hel. Viv. II, 245.—W. G. Binney, Terr. Moll. IV, 138.

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Achatina solida, SAY, Journ. Phila. Acad. V, 122 (1825); ed. BINNEY, 29.—DEKAY, N. Y. Moll. 56 (1843).—PFEIFFER, Mon. Hel. Viv. II, 246.

Agatina variegata, RAFINESQUE, Enum. and Acc. 3 (1831); ed. BINNEY and TRYON, 68.

Bulimus fasciatus, BINNEY, Terr. Moll. II, 266, pl. lv, lvi, lvii.—LEIDY, T. M. U. S. I, 252, pl. v (1851), anat.

Liguus fasciata, TRYON, Am. Journ. Conch. III, 165, pl. xii, f. 1–5, 6 (1867).

Liguus picta, TRYON, *l. c.* 165, pl. xiii, f. 4 (1867).

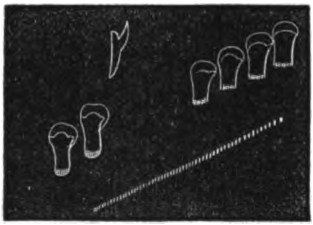
LISTER, Icon. *l. c.* t. xii, f. 7.—GUALT, *l. c.* t. vi, f. C. D.—D'ARGENVILLE, *l. c.* pl. xi, f. M.

Southern part of Florida and islands and keys adjacent to the coast, probably introduced from Cuba.

This species inhabits trees, upon the branches of which it is found. In winter it hibernates by attaching its aperture very strongly to the bark of the tree, by means of a thick, viscid, opaque secretion, which hardens to the consistency of glue. In tearing it away, the bark or the shell is fractured sooner than the secretion. At other times, when the animal withdraws into the shell, it secretes only a thin, transparent epiphragm.

Jaw (Terr. Moll. I, pl. v, f. 4 a, b) slightly arched, ends pointed; composed of numerous plates.

Fig. 366.



Lingual dentition of *Achatina fasciata*.

The lingual membrane has 94 rows of 55—1—55 teeth each, arranged diagonally across the membrane; teeth similar, stout, blunt, broader above than below, apex recurved.

The left-hand figure of Terr. Moll. pl. lvi, may be *A. picta*, Reeve (Con. Icon. f. 34).

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8699	2	Key Biscayne, Fla.	G. Wurdemann.	Cab. series.
8700	1	Indian Key, Fla.	"	"
8701	4	" "	"	"

DOUBTFUL SPECIES OF ACHATINA.

Liguus virgineus, MONTFORT, Conch. Syst. II, 423, Louisiana. (*A. virginea*, JAY, WHEATLEY. *Bulimus vexillum*, DEKAY.)

Achatina lubrica, BINNEY. See *Zua*.

Achatina bullata, PFR. See *Glandina*.

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Achatina truncata, Pfr. See *Glandina*.
Achatina vanuxemensis, Lea. See *Glandina*.
Achatina rosea, Deshayes. See *Glandina truncata*.
Achatina striata, DeKay, is *Glandina truncata*. See Terr. Moll. IV, 139.
Achatina subula, Pfr. See *Stenogyra*.
Achatina texasiana, Pfr. See *Glandina*.
Achatina australis, Villa, N. Am., Disp. 19.
Achatina pellucida, Pfr. See *Blauneria*.
Achatina gracillima, Pfr. See *Stenogyra*.
Achatina flammigera, Say (ed. Binney, 29) = *Orthalicus undatus*.
Achatina flammigera, Ferussac. See Terr. Moll. IV, 138.

ORTHALICUS, Beck.

Shell imperforate, ovate or oblong, ornamented with often articulated fillets, apex obtuse, last whirl inflated; columella filiformly thickened, sometimes callous, arcuate, obliquely subtruncate at base; aperture longitudinal, oval.

Fig. 367.

Jaw of *Orthalicus zebra*.

Jaw heavy, semilunar, composed of 16–22 semitriangular, free, imbricated plates, crenulated on the external free side.

The lingual membrane, as described under *Orthalicinæ*, on page 212, has uniform, short, bicuspid teeth. As stated in the foot-note to the same page, the lingual membrane of *Orthalicus undatus* does not agree with this.

Lingual membrane large, broad, covered with large, numerous, almost equal papillæ arranged in numerous, almost straight series, and furnished at the middle of their base with oblong, subquadrate, dilated, hooked denticles.

The genus *Orthalicus* does not properly belong to the fauna of North America. It is common in the West India islands, from whence specimens have become introduced to the Florida Keys. It is also found at Mazatlan, on the Pacific coast.

Subgenus ORTHALICUS, Beck, s. str.

Shell imperforate, ovate or oblong-conic, thin, striated, decussated with curling lines, and ornamented with usually articu-

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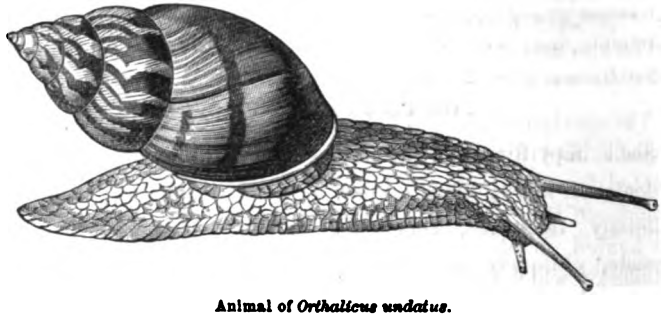
lated fillets and oblique swaths; whirls 6–8, the last inflated; columella filiform, loosely arcuated-intorted, obliquely subtruncated at base, aperture oval, peristome straight, its margins connected by a light callus.

Animal heliciform, large, scarcely included in the shell, ovipa-

Fig. 369.

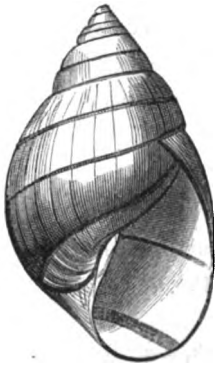


Animal of *Orthalicus undatus*.

rous; eggs moderate, oblong-subrotund, with a granulately-roughened, thick, calcareous covering.

Orthalicus zebra, MÜLL.—Shell ovate, conic, imperforate, rather thin, surface shining, smooth, scarcely broken by the very delicate incremental striæ; cream-colored, on the body-whirl darker; ornamented upon the body-whirl with three brownish narrow bands, the upper one very delicate, half way between the suture and the upper extremity of the peristome, the central one narrower, but very much darker, commencing at the upper extremity of the peristome, the third broader than the first, very dark, lighter at the edges, commencing at the centre of the parietal wall of the aperture; but one central, narrow, light band upon the upper whirls, two oblique bands marking the earlier peristomes; spire conic, apex pointed with dark brown; whirls six, convex, the last ventricose, three times as long as the spire; columella thickened with white callus, rather straight; aperture oblique, oval, within white, showing the bands; peristome thin, acute, broadly margined with black both without and within, its extremities joined with a shining,

Fig. 370.



Orthalicus zebra.

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chestnut, thin, deeply entering callus. Length 48, breadth 26; of aperture, length 27, breadth 14 mill.

Buccinum zebra, Müller, II, 188, no. 331.

Orthalicus zebra, Shuttleworth, Notit. Mal. 62, pl. viii, f. 3, 4 (1856).—Pfeiffer, Mon. Hel. Viv. IV, 588.

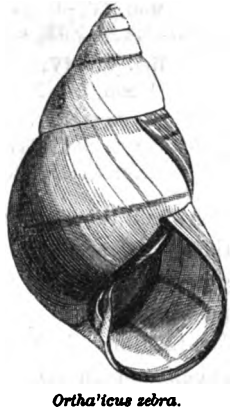
Helix (*Cochlostyla*) *undata*, Férussac, Tab. Syst. 52, no. 337; Hist. pl. cxv, f. 3, 5 (*fide* Beck), f. 6?

Bulimus zebra, W. G. Binney, Terr. Moll. IV, pl. lxxviii, f. 12.—Var. Reeve, Con. Icon. pl. xxvii, f. 90 b?

Vide also Seba, Thes. III, pl. xxxix, f. 50, 51.

Not *Bulimus zebra*, Binney, Terr. Moll.

Fig. 371.



Orthalicus zebra.

The specimen figured (Fig. 370) was collected at Key Biscayne, Florida. It is also quoted from Maranhon. It must be remembered that this is not the same shell as figured on plate 54 of the Terrestrial Mollusks, which is *O. undatus*.

The species is also found in Mexico. An individual, collected by Mr. J. Xantus in the Sierra Madre, is here figured (Fig. 371). It is from this that I extracted the jaw and lingual membrane figured on p. 215.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8703	1	Indian Key, Fla.	G. Wurdemann.	Cab. series.
9326	5	Tomla Talasco, Mex.	Xantus.	.....

Orthalicus undatus, Brug.—Shell imperforate, subconical, rather thick, smooth, incremental striæ fine, whitish, with longitudinal, irregular, undulating or somewhat zigzag, dark-brown bands and clouds, intersected by straight, revolving lines of the same color; the body-whirl often with one or more straight, brown lines, at irregular intervals, indicating the former margins of the aperture; spire conic, apex obtuse; whirls six to seven, diminishing in diameter rapidly, body-whirl capacious, occupying two-thirds of the whole length of the shell; aperture ample, ovate, showing the external colors within; peristome simple, acute, bordered with dark brown, or black, both internally and externally; parietal wall with a thin, shining,

Fig. 372.

Orthalicus undatus.

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brownish, entering callus; columella slightly thickened, not reflected, nor truncate, making a continuous curve with the peristome. Common length of axis about 50 mill., diameter of large whirl rather more than 25 mill.

(*Bulla*) *Zebra mulleri*, CHEMNITZ, IX, P. 2, p. 24, pl. cxviii, f. 1815, 1816.
Helix (*Cochlostyla*) *undata*, FERUSSAC, Tab. Syst. p. 32, no. 337; Hist. pl. cxv, f. 1, 4; pl. cxiv, f. 5, 6.
Bulimus (*O.*) *undatus*, D'ORBIGNY, Cuba, I, 174, pl. vi, f. 9, 10.
Bulimus zebra, BINNEY, Terr. Moll. II, 271, pl. liv.—W. G. BINNEY, Terr. Moll. IV, pl. lxxvii, f. 13?—PFEIFFER, Mon. Hel. Viv. II, 143.
Orthalicus undatus, SHUTTLEWORTH, Not. 63, pl. iii, f. 4, 5.—PFEIFFER, Mon. Hel. Viv. IV, 589.—TRYON, Am. Journ. Conch. III, 166, partly only, pl. xiii, f. 1, 2, not 3 (which is *O. zebra?*) (1867).
Bulimus reses, SAY, New Harm. Diss. Dec. 30 1830; BINNEY's ed., p. 39.
Agatina fuscata, RAFINESQUE, Enum. and Acc. p. 3 (1831); BINNEY's and TRYON's complete edition, 68.

Animal thick and massive, dirty, or yellowish-white, darker on the middle of the back; surface rugose, with prominent, oblong glands, and deep furrows. Whole length, exclusive of eye-peduncles, three inches. Eye-peduncles, when fully extended, one inch long, bulbous, with small, black, ocular points; tentacles one-fifth of an inch long, slender. Orifice of generation behind the tentacle on the right side. Mantle somewhat bilobed, protruding beyond the aperture, and slightly reflected. Posterior extremity rounded, sides corrugated, lower surface smooth, squalid.

Found in Jamaica and Cuba, and at Key West; also at Mazatlan. The specimens figured in the Terrestrial Mollusks were received from the southern part of the peninsula of Florida.

This species inhabits trees. It attaches itself to the tree during hibernation, and covers its aperture by an opaque, inspissated, glutinous secretion, which, though exposed to wind and rain, forms a perfect adhesion and protection to the animal, and only yields to its own solvent powers on the approach of spring. It exists in great numbers; and the dead shells are a favorite habitation of a species of hermit crab.

The figure of the animal of *Orthalicus* given on p. 216, is reduced from a drawing prepared for the Terrestrial Mollusks, but not there figured. On plate 77, fig. 13, of vol. IV, I have given another view of the same shell, also prepared for publication in the Terrestrial Mollusks. I am not certain from what

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locality the shell was received, but from the fact of Dr. Binney describing in his work no shells but what he knew to exist in the United States, I am inclined to believe he received it from Florida. His collector would be more likely to furnish him with a living specimen from that point, than he to receive it from some Mexican or South American locality. I do not know to which species it may be referred, but presume it to be *B. undatus*. He thus describes it:—

The most beautiful form of the species is that figured in plate liv, a. It is quite thick and ponderous; its general color is deep brownish, variegated with undulating intervals of white on the spire, and others more obscure on the columellar side of the body-whirl. On the side opposite to the aperture, the brown color is relieved only by three indistinct and ill-defined dark bands, and by the black line showing the margin of a former peristome. The columella is considerably thickened and folded; and the columellar margin is covered by a black callus; and the peristome is broadly margined internally with black; further in, the aperture is purely white.

Mr. Say no doubt referred to *O. undatus* under the name of *Achatina flammigera*, Fer. (ed. Binney, p. 29). He mentions also the manuscript name of *reses*, which he had intended to give to a shell found on trees at the southern extremity of east Florida, but which he afterwards found to be *Bulimus undatus*, Brug.

Rafinesque's description of *Agatina fuscata* will be found on p. 50 of Terr. Moll. I. The locality (Louisiana) is doubtful.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
3474	2	Taboga, Mex.	.....	Cab. series.

MACROCERAMUS, Guild.

Shell turreted or lengthened-conic, rimate; whirls 9–15, gradually increasing, the last often angular; aperture round, short, columella usually plicate; peristome expanded, its margins subequal, subparallel, not continuous, the external arched, the columellar dilated, reflected.

Jaw (of *M. signatus*[1]) very strongly arched, composed of

[1] Bland, Ann. N. Y. Lyc. VIII, 162, f. 5, 6 (1865).

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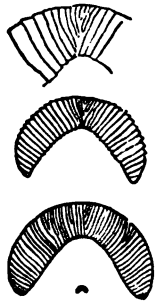
Fig. 373.

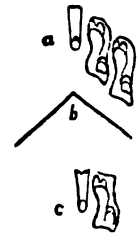


Jaw of *Macroceramus signatus*. [BLAND.]

numerous separate plates, converging towards and crenulating the cutting margin.

Lingual dentition (of *M. signatus*[1]) : Teeth arranged en chevron. Central plate narrow with one small obtuse denticle, laterals with one prominent tooth supporting two denticles and a small one at base.

Fig. 374.



Lingual dentition of *Macroceramus signatus*. [BLAND.]

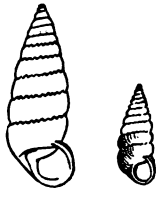
SUBGENUS **MACROCERAMUS**, Guild. s. str.

Shell striate or costulate, conical, often turreted, white, variegated with brownish; apex whole; whirls 9–12; aperture rounded-quadrangular, not effuse.

Animal (of *M. kieneri*) whitish, translucent, a little darker above the head; body very short, terminating in a blunt extremity; eye-peduncles of moderate length, of nearly equal diameter throughout, terminating in a rounded bulb; tentacles very short, nearly rudimentary; ocular points large and black.

Macroceramus kieneri, PFEIFFER.—Shell fusiform, attenuated-cylindrical, whitish, or grayish clouded and marbled with brown; spire acuminate; whirls from nine to thirteen, rounded, with numerous oblique, prominent striæ or ribs; suture impressed, crenulated by the extension of the alternate ribs across it; aperture rounded, oblique; peristome thin, somewhat reflected; axis impressed, not truly perforate; on the last whirl a colored line revolves: this is sometimes raised a little from the surface, and sometimes is sharp like a delicate carina. Length 18, diam. of antepenultimate whirl 6; of aperture, length 4½, breadth 4⅓ mill.

Fig. 375.



Macroceramus kieneri.

Pupa unicarinata, BINNEY, Terr. Moll. I, not LAMARCK.

Bulimus kieneri, PFEIFFER, Proc. Zool. Soc. 1846, 40; Mon. Hel. Viv. II, 79; in CHEMNITZ, ed. 2, 131, pl. xlii, f. 23, 24.—REEVE, Con. Icon. 463.

[1] Bland, Ann. N. Y. Lyc. VIII, 162, f. 5, 6 (1865).

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Cylindrella pontifica, GOULD, Proc. Bost. Soc. Nat. Hist. III, 40 (1848); Terr. Moll. II, 306, pl. lxix, f. 1.—CHENU, Man. de Conch. I, 446, f. 3305, 3306 (1859).

Macroceramus pontificus, W. G. BINNEY, Terr. Moll. IV, 137.

Macroceramus kieneri, PFEIFFER, Mon. Hel. Viv. IV, 689.

Florida, from Tampa Bay to Key West. Also Cape Florida and Key Biscayne. Also Cuba.

When in motion, the axis of the shell is parallel with the line of progress, and lies almost horizontally. The rapidity with which the animal moves is quite surprising. The advance seems to be effected in this way: The posterior point of the disk of the foot, being detached from the object on which it rests, is carried forward by muscular contraction and again fixed, leaving a curve between the attached point and the next anterior part of the disk, which is not yet detached. This operation is continued throughout the whole disk, every part of which becomes successively detached, curved upward, and again attached, from the extremity to the snout, exhibiting in action a curved or wavy motion, or undulation, commencing at the extremity, proceeding rapidly forward, and terminating at the head. But before one muscular wave is exhausted at the head, another has begun to flow; so that two series of undulations are visible at one time. With this double alternation of action, the body is propelled with a rapidity greater than can be attained by the more common, gliding motion of the *Helices*. During motion the eye-peduncles are extended, and remain steadily in one position.

They are found in woods, on the ground, under leaves, but are not very plentiful. The most northern point where they have hitherto been noticed is Tampa. On the eastern shore of the peninsula, they occur at Cape Florida, and also at Key West and Key Biscayne.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8702	1	Florida.	W. G. Binney.	= *pontificus*, teste A. A. G. Cab. ser.

Macroceramus gossei, PFEIFFER.—Shell rimate, turrito-cylindrical, obliquely ribbed, white, opaque, with semilunar blotches and pellucid, horn-colored spots; spire cylindraceous, apex attenuated and acute; suture crenulated; whirls eleven, convex, the last about one-fourth the length of the shell, rounded, subangulate at base; aperture sub-

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Fig. 376.

Macroceramus gossei.

circular; peristome briefly expanded, with approaching termini, the columellar expansively reflected. Length 11, diam. 3⅜; aperture 3½ mill. long, 3¼ broad.

Bulimus gossei, PFEIFFER, Proc. Zool. Soc. 1845, 137; Mon. Hel. Viv. II, 81; in Roemer's Texas, 456.—REEVE, &c. —W. G. BINNEY, Terr. Moll. IV, 135.

Cylindrella hydeana, concisa, &c., see PFEIFFER.

Macroceramus gossei, PFEIFFER, Mon. Hel. Viv. IV, 689.

Var. β. Somewhat smaller, the spots and blotches more obsolete.

From Jamaica, the variety from Texas.

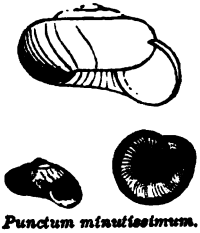
Little Sarazota Bay, near Charlotte Harbor, Florida.

PUNCTUM, MORSE.

Shell bearing the usual characters of *Hyalina* (see p. 29), from which it is generically separated by the nature of the jaw and lingual dentition (see Fig. 378).

Punctum minutissimum, LEA.—Shell umbilicated, subglobose, reddish horn-color, shining, marked with strong transverse striæ and microscopic revolving lines, both most prominent near the umbilicus; whirls four, convex, gradually increasing, the last broadly umbilicated; aperture subcircular, oblique; peristome simple, acute, its columellar extremity subreflected. Greater diam. 1½ mill., height 1.

Fig. 377.



Punctum minutissimum.

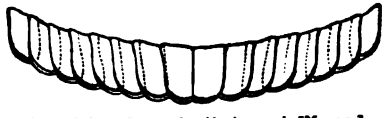
Helix minutissima, LEA, Trans. Am. Phil. Soc. IX, 17; Proc. II, 82 (1841); Obs. IV, 17 (1844); TROSCHEL, Arch. f. Nat. 1843, II, 124.—PFEIFFER, Mon. Hel. Viv. I, 87.—W. G. BINNEY, Terr. Moll. IV, 100, pl. lxxvii, f. 6, 7.—MORSE, Amer. Nat. I, 546, f. 45 (1867).

Helix minuscula, teste BINNEY, Terr. Moll. II, 221.

Punctum minutissimum, MORSE, Journ. Portl. Soc. I, 27, f. 69, 70, pl. viii, f. 71 (1864).

Conulus minutissima, TRYON, Am. Journ. Conch. II, 257, pl. iv, f. 63 (1866).

Fig. 378.



Jaw of *Punctum minutissimum*.[1] [MORSE.]

Maine, Massachusetts, New York, Ohio.

Jaw composed of sixteen

[1] The character of the jaw would place the species in the subfamily

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long slender corneous laminæ, recurved at their cutting edges, these plates partly lapping over each other.

Fig. 379.

Lingual dentition of *Punctum minutissimum*. [MORSE.]

Lingual membrane with 51 arched rows of 13—1—13 teeth; plates long and narrow, becoming narrower as they approach the sides of the membrane; plates transparent, denticles light horn-color, central plate largest with one small denticle, laterals with two equally short rounded denticles, those on the verge of the membrane having three minute denticles.

SUBFAMILY PUPINÆ.

Jaw small, slightly arcuate, with delicate perpendicular striæ, sometimes only visible on the margin; concave margin sometimes with a central projection.

Teeth of the lingual ribbon uniform, short, bicuspid or tricuspid.

CIONELLA, JEFFREYS.

Shell oblong-acuminate or ovate-oblong, striated or smooth, shining; whirls 6–7, the last rounded; aperture oval, equalling about one-half to one-third the shell's length; columella short, arcuate, more or less truncated, peristome straight, often thickened.

Fig. 380.

Jaw of *Cionella subcylindrica*.

Jaw slightly arched, slender, furrowed with delicate, vertical striæ, its concave margin scarcely denticulated.

Lingual teeth arranged in transverse series, central tricuspid, laterals bicuspid, uncini serrated.

Orthalicinæ, as a distinct genus, for which Mr. Morse's name *Punctum* might be retained; otherwise the species would be placed in *Hyalina*.

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Fig. 381.

Lingual teeth of *Cionella subcylindrica*.

SUBGENUS **ZUA**, Leach.

Shell ovate-oblong, imperforate, smooth, pellucid, glistening, dark horn-colored; whirls rather convex; aperture less than one-half the shell's length, ovate; columella more or less truncated; peristome blunt, its margins joined by callus.

Fig. 382.

Animal of *Zua*.[1]

Animal short, stout, tail pointed; eye-peduncles long, stout, tentacles very short.

Cionella subcylindrica, LINN.—Shell small, thin, transparent, oblong-oval; epidermis smoky horn-color, smooth, very bright and shining; whirls five or six, somewhat rounded, the last equalling two-fifths the shell's length, rounded at base; apex obtuse; suture somewhat impressed; aperture lateral, oval, its plane nearly parallel with the axis of the shell; peristome simple, thickened, often slightly rufous; umbilicus imperforate; columella obsoletely truncated at base. Length 6, diam. 2½; aperture 2½ long, ½ mill. wide.

Fig. 383.

Cionella subcylindrica, enlarged.

Helix subcylindrica, LINN. Syst. ed. XII, II, 1248 (1767).—Not MONT.

Helix lubrica, MÜLLER, Verm. Hist. I, 104 (1774).

Bulimus lubricus, DRAPARNAUD, Moll. 75, pl. iv, 24.—GOULD, Invertebrata, 193, f. 124 (1841).—ADAMS, Shells of Vermont, 157 (1842).—DEKAY, N. Y. Moll. 55, pl. iii, f. 43 (1843).—BINNEY, Terr. Moll. II, 283, pl. lii, f. 4.

Achatina lubrica, PFEIFFER, Mon. Hel. Viv. II, 272.—W. G. BINNEY, Terr. Moll. IV, 138.

Zua lubrica, LEACH, Moll. p. 114.—GRAY, Man. 188.—REEVE, Brit. L. & Fr. W. Sh. 93 (1863).

Cionella lubrica, JEFFREYS, Linn. Trans. XVI, 327.

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[1] *Zua subcylindrica*, from Reeve, very much enlarged.

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Bulimus lubricoides, Stimpson, Sh. of N. E. 54.

Bulimus subcylindricus, Moquin-Tandon, Moll. Fr. II, 304, pl. xxii, f. 15–19.

Zua lubricoidea, Morse, Journ. Portl. Soc. I, 30, f. 79, 81, 84; pl. x, f. 82 (1864); Amer. Nat. I, 607, f. 49 (1868).

From Canada to the Red River of the North, and English River. In Nebraska. In New England and the States bordering the great lakes.

Animal: Head, back, and eye-peduncles blue black, foot paler, shorter than the shell; tentacles short.

This little species, which is hardly larger than a grain of wheat, is certainly identical with the European shell. It is distributed over a vast expanse of country, and exists in immense numbers in certain favorable localities. Its usual place of abode is under leaves and the bark of decaying trees, in forests and groves. Its surface has a peculiarly brilliant reflection, which excels that of any other of our shells; and hence it has been known in France as "la brillante." There is a slight sinuosity at the union of the peristome with the columella, rendering the aperture a little effuse at this point, and approximating the shell to the genus *Achatina*. This, and its other departures from the typical *Bulimuli*, have caused it, in several instances, to receive a generic distinction. Dr. Leach first indicated it as a separate genus, under the name *Zua*.

This is one of the circumpolar species common to Europe, Asia, and America. On this continent it is not found farther south than the Middle States. In Europe it is found in Spain, Italy, and Illyria, as well as the extreme northern countries. Pfeiffer also quotes it from Madeira.

Its identity with the species of the old world has been doubted, and the specific name *lubricoides* applied to it.[1] I have no doubt of its being the same species, being unable to detect any differences between American and foreign individuals. In criticizing the plates of the Terrestrial Mollusks, Dr. Pfeiffer notices considerable difference between the figure there given and the European shells (Mal. Blatt. 1858, 28).

Moquin-Tandon (II, 305) describes the jaw as low, slightly arched, light horn-colored, extremities attenuated, somewhat

[1] This is preoccupied.

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pointed, vertical striæ very fine, scarcely any denticles on the concave margin. Morse describes the jaw of specimens from Maine as slightly arcuate, tapering to a point laterally; anterior surface with conspicuous longitudinal striæ; the middle of the concave margin produced into an obtuse beak.

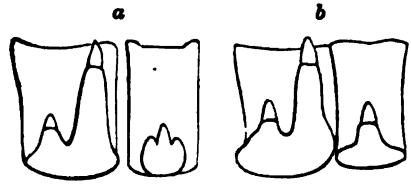
Fig. 384.

Jaw of *Cionella subcylindrica*. [Morse.]

On p. 224 I have given a figure of the lingual membrane of a Maine specimen. There are 90 rows of 43 teeth (21—1—21); central plate long, very narrow, with a minute central tooth, with traces of a denticle at each side of its base; laterals square, bicuspid, first cusp wide and strong, as long as plate, second cusp short, obtuse; first seven uncini tridentate, inner denticle prominent; the rest short wide plates, denticulated, two extreme uncini plain.

Fig. 385 *a* gives an enlarged view of the central and first lateral

Fig. 385.



Teeth of *Cionella subcylindrica*. [Morse.]

teeth of an American specimen, which may be compared with the fac-simile (Fig. 385 *b*) of the same, of Thomson (Annals Nat. Hist. VII), from an English specimen. The differences between the central teeth are certainly very great, but of what value in determining specific distinction I am not prepared to say.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8431	1	Milwaukee, Wis.	I. A. Lapham.	.....
8432	22	Kansas.	.....	.....
8433	20	Maine.	Dr. J. Lewis.	.....
8434	29	Mohawk, N. Y.	"	.....
8435	2	Massachusetts.	W. Stimpson.	.....
8685	15	"	W. G. Binney.	Cab. series.
8796	20+	"	W. Stimpson.	.....
9083	1	English River.	R. Kennicott.	.....

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SUBGENUS **ACICULA**, (Leach,) Risso.

Shell elongate, imperforate, polished, vitreous, white, apex rather obtuse; aperture equalling about one-half the shell's length, oblong; columella subarcuate, distinctly truncated, peristome simple, acute. No eyes.

Fig. 386.

Animal of *Acicula*.[1]

Animal short, slender, tail acutely pointed, eye-peduncles very long, slender, tentacles short, stout.

Cionella acicula, MULL.—Shell cylindrically fusiform, needle-like, attenuated towards the obtuse apex, glassy, polished, white; suture narrowly margined; whirls six to seven, flattened, the last equalling two-fifths of the shell's length; columella arcuate, narrowly and abruptly truncated at its base; aperture narrow, lanceolate; peristome simple, straight, acute. Length 4⅔, diam. 1¼; of aperture, length 2, breadth ¾ mill.

Fig. 387.

Cionella acicula, enlarged.

Buccinum acicula, MULLER, Verm. Hist. II, 150 (1774).
Bulimus acicula, BRUGUIERE, &c., MOQUIN-TANDON, Moll. Fr. II, 309, pl. xxii, f. 32, 34.
Achatina acicula, LAMARCK, &c., PFEIFFER, Mon. Hel. Viv. II, 274.—REEVE, Brit. Land and Fr.-Water Shells, 97, fig.
Buccinum terrestre, MONTAGU, &c. &c. For further syn. see PFEIFFER.

The shell figured is from Florida (*Bartlett!* in coll. A. Binney). It agrees well with English specimens, so that I have no doubt of its being the species to which I have referred it. It is not like *A. iota*, of Jamaica, or *A. gundlachi* of Cuba.

Pfeiffer gives Europe and Madeira as the habitat of *A. acicula*. It is said by Moquin-Tandon to live in the crevices of rocks and under moss and dead leaves.

Specimens have lately been found at Princeton, N. J., doubtless imported on plants.

STENOGYRA, SHUTTL.

Shell turreted, sometimes truncated, hyaline or white, with a delicate horn-colored, sometimes reddish epidermis; whirls

[1] From Reeve: *C. acicula*, very much enlarged.

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straight, numerous, 7–18 in number, gradually enlarging; apex obtuse; aperture semi-oval or ovate-oblong; peristome straight, generally simple; columella usually truncated.

Fig. 388.

Jaw of *Stenogyra decollata*. [MOQ.-TAND.]

Jaw arcuate, delicately striated and denticulate. Middle lingual teeth very small.

SUBGENUS **RUMINA**, Risso.

Shell obsoletely rimate, calcareous, normally truncated, cylindrically-elongate; remaining whirls 4–6, the upper truncated ones 8–10, the upper one globular; aperture semioval; peristome straight, thickened within, its margins connected with callus, the columellar twice as short as the external one; columella not truncated.

Fig. 389.

Animal of *Stenogyra decollata*.

Animal short, stout, surface finely granulated; tail short, rather bluntly terminating; eye-peduncles long, slender, tentacles very short.

Stenogyra decollata, LINN.—Shell rather thick, long, cylindrical, turreted; epidermis shining, whitish, with a slight tint of brownish or yellowish; apex obtuse; spire gradually enlarging from the apex to the aperture, commonly abruptly truncated between the third and fifth whirls next the aperture; whirls remaining three to five, flat, a little wrinkled, and in the last two or three slightly crenate, or plaited below the suture; suture not impressed; aperture lateral, oval, angulated superiorly, its plane very nearly parallel with the axis of the shell; peristome simple, thickened within, its columellar portion reflected. Axis of the truncated shell usually about 25 mill., diameter of the largest whirl less than 12 mill.

Fig. 390.

Stenogyra decollata.

Helix decollata, LINNÆUS, Syst. Nat. 1247, &c.

Bulimus decollatus, DRAPARNAUD, 76, pl. iv, f. 27, &c.—PFEIFFER, Mon. Hel. Viv. IV, 456.—BINNEY, Terr. Moll. II, 280, pl. I, f. 1.—W. G. BINNEY, Terr. Moll. IV, 131.—LEIDY, T. M. U. S. I, 259, pl. xv, f. 5, 6 (1851), anat.

Bulimus multilatus, SAY, Journ. Acad. Nat. Sci. Philad. II, 373; ed. BINNEY, 25 (err. typ. for *mutilatus*).

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Bulimus mutilatus, DEKAY, N. Y. Moll. 56 (1843).—PFEIFFER, Mon. Hel. Viv. II, 153; III, 397.—REEVE, Con. Icon. f. 331.

An European species, introduced at Charleston, S. C., where it has increased very rapidly, and has retained its position for more than fifty years.

Animal (see Fig. 389): Body short, extending but little behind the aperture, blackish, or bluish-black on the head and back, with decidedly green reflections in certain lights, the sides and posterior extremity olivaceous; surface finely granulated; eye-peduncles slender and rather short; ocular points very small; tentacles very short. The shell is carried nearly horizontally when in motion. It is very voracious in its habits. I kept a number of individuals received from Charleston a long time as scavengers, to clean the shells of other snails. As soon as a living *Helix* was placed in the box with them, one would attack it, introduce itself into the inner whirls, and completely remove the animal. Leaving a number of *Succinea ovalis*, Gld., with them one day, they disappeared entirely in a short time. The *Stenogyra* had eaten shell as well as animal.[1]

The young shell is thin, transparent, and fragile; the old is opaque and rather thick. It is very peculiar in respect to the manner of breaking off and abandoning successive portions of the spire. According to the plan upon which the shell is projected, it would, when it reaches the full size which it attains in this country, possess ten or more full volutions, if it retained all of them from the apex downward. But as fast as the growth of the animal compels it to increase the number and volume of the whirls, it releases its connection with the superior whirls, creates a new attachment lower down, forms a new apex or spiral calcareous septum, which separates it from the abandoned part; and, in some manner which is not understood, breaks and throws off those whirls which are no longer of use.[2] This commences at a very early period; the original apex being thrown off when the shell has acquired five or six whirls. They differ,

[1] I find no notice of any such carnivorous habits mentioned by Moquin-Tandon. It may be the species prefers vegetable food, but being deprived of that was forced by hunger to devour animal food.

[2] Moquin-Tandon says (on the authority of Gassies) that the animal breaks off the upper whirls by jerking round its shell against some hard object.

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in this particular, from most of land shells, and especially from the *Helices*, which always, so far as I know, retain their original attachment to the apex of the shell. It has been thought that the breaking of the spire, after being left by the animal, and becoming dry and brittle, is accidental; but I conceive that the effect is much too constant to be accounted for in that way. I have never been able to find a mature specimen with the apex. And in all the various countries which it inhabits, including the whole southern part of Europe, the northern part of Africa, the islands of the Mediterranean, the Canaries, Madeira, &c., the same peculiarity attends it. If it were only an accident, some few in this wide extent might escape. I doubt not, therefore, that it is effected by the action of the animal itself. It may be that the calcareous matter of the shell is absorbed at the point of division, previous to the formation of the new septum.

Mr. Say made out his description from an imma ture specimen.

Fig. 391.

Jaw of *Stenogyra decollata*. [Moq.-Tand.]

Moquin-Tandon describes the jaw as low, somewhat curved from front backwards, of a tawny orange color, extremities attenuated, generally somewhat pointed; the concave margin forming an elliptical arch with a slight projection towards the middle; vertical striæ very delicate; marginal denticles scarcely perceptible.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8704	4	Charleston, S. C.	W. G. Binney.	Cab. series.

Subgenus OPEAS, Albers.

Shell minutely perforated or rimate, thin, striated, slightly or moderately smooth; whirls 6–8, rather convex, the last usually compressed; aperture ovate-oblong, equalling one-third to one-fourth of the shell's length; peristome simple, acute, its columellar margin reflected. Size moderate or small.

Stenogyra subula, Pfr.—Shell small, elongated, turreted, transparent, with delicate, longitudinal striæ, sometimes of a spermaceti white, and sometimes wax-yellow; whirls about eight, convexly rounded, revolving more closely at apex than elsewhere, so as to form a somewhat

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obtuse summit, the last whirl less than one-third the length of the shell; suture deeply impressed; columella nearly straight; aperture elongated, narrow, rhomboid-elliptical; peristome simple, its right margin straight, its columellar margin slightly reflexed, protecting a minute umbilical perforation. Length of axis 13 mill., diameter about 3 mill.

Fig. 392.

Stenogyra subula.

Achatina subula, PFEIFFER, Wiegm. Archiv. 1839, I, 352.
Bulimus subula, PFEIFFER, Symbolæ, I, 85; Mon. Hel. Viv. II, 158.—BINNEY, Terr. Moll. II, 285, pl. liii, f. 4.—W. G. BINNEY, Terr. Moll. IV, 134.—REEVE, Con. Icon. f. 494.
Bulimus octonoides, D'ORBIGNY, Moll. Cub. I, 177, tab. xi, f. 23, 24; pl. xi *bis*, f. 22–24.
Bulimus procerus, ADAMS, Proc. Bost. Soc. Nat. Hist. II, 13.
Bulimus hortensis, ADAMS, *vid.* Contr. to Conch. p. 221.

Found at Ft. Dallas, Florida (*Cooper*), and in several of the West India Islands, Cuba, St. Thomas, Jamaica, Porto Rico. Also at Chiapa, Mexico (*Pfeiffer*).

This species belongs to a somewhat numerous group found in the tropics, wherever the banana and other *Musaceæ* flourish; some of which have the columella truncated, and were formerly arranged under the genus *Achatina*, like *S. octona*, though by their natural affinities they are clearly associated. The banana and plantain have, by transplantation, become naturalized throughout the tropics; and it is highly probable that many shells found with them, which have received different names merely because they have been found in localities far remote from each other, are really identical. This shell is considerably smaller and more rapidly tapering than *S. octona*, which has its columella somewhat truncated, and has not as yet been found on this continent.

Cat. No.	No. of Sp.	Locality.	From whom received	Remarks.
8710	7	Florida.	W. G. Binney.	Cab. series.

SUBGENUS MELANIELLA, Pfr.

Shell imperforate, ribbed, usually decussated, sculptured, brownish horn-colored, rather solid; whirls 9 rather convex, graduated, the three or four upper ones without ribs; aperture effuse at base, ovate; columella constricted; peristome simple, subcontinuous.

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Stenogyra gracillima, Pfr.—Shell imperforate, minute, elongated, very slender, thin, of a drab-white color, ornamented with elevated, compressed, sharp, rather distant, longitudinal ribs, of which there are from twenty to thirty on each whirl, the interstices sculptured by very crowded lines; spire obtuse at the apex, and composed of about eight flattish whirls, the last of which is about one-fourth the length of the shell, and somewhat angular below the middle; suture deeply impressed; aperture small, elongated, rhomboidal-ovate; peristome sharp, and somewhat pressed inward, so as to be parallel to the axis; the columella is straight, and joins the peristome at an angle, so as almost to form a notch at the base of the aperture. Length 7, diam. 1¾; aperture 2 mill. long, 1 wide.

Fig. 393.

Stenogyra gracillima, magnified 4 times.

Achatina gracillima, Pfeiffer in Wiegm Arch. 1839, I, 352.—Binney, Terr. Moll. II, 293, pl. liii, f. 3.

Bulimus gracillimus, Pfeiffer, Symb. III, 54; Mon. Hel. Viv. II, 160.—Reeve, Con. Icon. 594.—W. G. Binney, Terr. Moll. IV, 134.

Achatina striato-costata, D'Orbigny, Moll. Cub. I, 176, pl. xi, f. 19–21?

Cuba, St. Thomas, and Florida; also Bahamas.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8709	2	Florida.	W. G. Binney.	Cab. series.

Spurious Species of Stenogyra.

Stenogyra (*Subulina*) *octona*, Chemnitz, has been found in greenhouses, having been introduced on plants.

PUPA, De.

Shell cylindrical, ovate or buliform, rimate or perforate; last whirl proportionally small; aperture semioval or subrotund, generally furnished with entering, fold-like denticles; peristome expanded or subsimple, margins equal, subparallel, distant, usually connected with a callous lamina.

Fig. 394.

Jaw of *Pupa corticaria*. [Morse.]

Jaw somewhat arcuate, furrowed with delicate striæ, its concave edge unbroken, generally somewhat prominent in the middle.

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Lingual band narrow, central teeth tricuspid, laterals bicuspid, uncini serrated.

Fig. 395.

Lingual dentition of *Pupa corticaria*. [MORSE.]

Most of the species are so small that it requires much care and no little skill to find them. Some are found in forests, under decaying leaves, or fragments of dead branches, lying on the ground, or in the crevices of bark, or about decaying stumps and logs; some are found in plats of moss, others under stones, sticks, etc., in the open fields; and many at the margins of brooks, pools, and ponds, under chips, or crawling up the stems of plants, and seem to be incapable of existing unless abundantly supplied with moisture, seeming to be aquatic rather than terrestrial in their habits. They feed on decaying vegetable matter, keeping themselves in the shade, and adhering closely to the objects on which they rest when in repose. In the winter they bury themselves under the leaves or in the earth.

SUBGENUS **PUPILLA**, Leach.

Shell deeply rimate or perforate, cylindrically shortened, apex extended into an obtuse cone; horn-colored, smooth; whirls 5–9; aperture rounded with few or no folds; peristome somewhat expanded.

Fig. 396.

Animal of *Pupa muscorum*. [REEVE.]

Animal small, short, tail short, pointed; eye-peduncles long, tentacles stout, very short.

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Pupa muscorum, Lin.—Shell perforate, cylindrical, subfusiform, obtuse at both extremities; epidermis dark chestnut-color, or bay; whirls six to seven, rounded, the anterior four of about equal diameter; suture deep; aperture lateral, nearly circular, small, its diameter equal to two-thirds of the diameter of the last whirl, a thin, testaceous deposit forming a thickened margin internally, sometimes bearing an obtuse tubercle; upon the parietal wall is a single tubercle; transverse margin subreflected; lip slightly reflected. Length 4, breadth 1½ mill.

Fig. 397.

Pupa muscorum, enlarged.

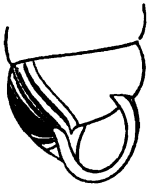
Pupa badia, Adams, Bost. Journ Nat. Hist. III, 331, pl. iii, f. 18; Shells of Vermont, 157.—Gould, Bost. Journ. Nat. Hist. III, 404; IV, 360.—DeKay, N. Y. Moll. 49, pl. iv, f. 45.—Chemnitz, ed. 2, 117, pl. xv, f. 25–29.—Binney, Terr. Moll. 323, pl. lxx, f. 3. —W. G. Binney, Terr. Moll. IV, 142.

Pupa muscorum, Linnæus, part, Pfeiffer, Mon. Hel. Viv. IV, 666, &c.

Pupilla badia, Morse, Journ. Portl. Soc. I, 37, f. 89, 91, pl. x, f. 92 (1864); Amer. Nat. I, 609, f. 52 (1868).

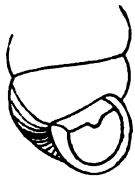
Found in the islands in the Gulf of St. Lawrence, and in Maine, Vermont, and New York. Its range in Europe is very great, being found from Siberia to Sicily, England, Iceland, &c.

Fig. 398.



Pupa badia. [Morse.]

Fig. 399.



Pupa muscorum. [Morse.]

The shell is often met with an edentulate aperture. Such is the specimen figured in the second edition of Chemnitz, and my figure (Fig. 398), drawn from a Maine specimen. Fig. 399 is drawn from an European individual of *P. muscorum*.

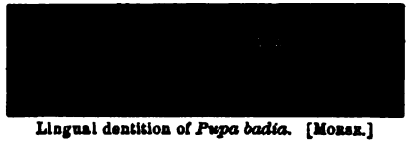
Fig. 400.

Jaw of *Pupa badia.* [Morse.]

Jaw of American specimen slightly arched, concave edge waving.

The lingual membrane has 90 rows of 29 teeth each (14—1—14). Central teeth small, tricuspid, the laterals bicuspid, uncini serrated.

Fig. 401.



Lingual dentition of *Pupa badia.* [Morse.]

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Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8410	1	Yellowstone.	.....	.....
8111	3	New York.	Dr. J. Lewis.	.....
8697	11	Maine.	W. G. Binney.	Cab. series.

Pupa blandi, Morse.—Shell rimate, ovate cylindrical, delicately striated, opaque, light brown; apex obtuse, nucleus with microscopic granulations; suture well defined; whirls six, subconvex, the last ascending at the aperture, rapidly expanding, with an external whitish callus, between which and the peristome there is a deep constriction; aperture small, nearly circular, with three obtuse teeth of about equal size, one on the parietal margin, one on the columellar margin, and the third far within and at the base of aperture; peristome subreflected, the margins joined by a thin callus. Length .13 inch, breadth .06 inch. (*Morse.*)

Fig. 402.

Pupa blandi.

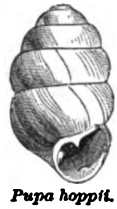
Pupilla blandi, Morse, Ann. N. Y. Lyc. VIII, 211, f. 8 (Nov. 1865).

Pupa blandi, W. G. Binney, Expl. in Nebraska, Ex. Doc. 25th Congress, 2d Sess. II, part 2, p. 725 (1859), no descr.

In drift on Missouri River, near Ft. Berthold.

Pupa hoppii, Möller.—Shell subperforate, cylindrically ovate, thin, very delicately striated, horn-colored, shining, pellucid; spire terminating in an obtuse cone; whirls five, rather convex, the last scarcely equalling two-fifths the shell's length, ascending above, somewhat narrowed towards the base; columella deeply subplicate, parietal wall of the aperture furnished with one tooth-like callus; aperture vertical, subsemicircular; peristome thin, scarcely expanded, its right termination quite arched. Length 2¾, diam. 1 mill.

Fig. 403.



Pupa hoppii.

Pupa hoppii, Möller, Ind. Moll. Gr. 4 (1842).—Troschel, Arch. f. Nat. 1843, II, 126.—Chemnitz, ed. 2, 163, pl. xix, f. 29, 30.—Pfeiffer, Mon. Hel. Viv. II, 328; III, 536; IV, 666.—W. G. Binney, Ter. Moll. IV, 147, pl. lxxviii, f. 20.

Pupa steenbuchii, Beck, teste Mörch, Nat. Bidrag af Gr. 75.

Inhabits Greenland, and has also been found at Anticosti Island.

The description given above is translated from Pfeiffer. The specimen figured, which I refer to this species, has another denticle on the columella, and a lamina-like process within the aperture at the base of the last whirl.

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Pupa variolosa, GOULD.—Shell minute, ovate-conical, with a pointed apex, of a yellowish-green color, apparently smooth, but when examined by a considerable magnifying power, is found to be thickly pitted with dots of unequal size and irregularly disposed; there are four or five narrow, tumid whirls, separated by a profound suture; the aperture is obliquely semioval, and has a posterior lamellar tooth winding within the shell, a tooth on the columella, and another a little to the right of the basal apex; a small umbilical opening is covered by the reflected columellar margin of the peristome, and the other margin is slightly everted. Length 2 mill., diam. 1.

Fig. 404.

Pupa variolosa.

Pupa variolosa, GOULD, Proc. Bost. Soc. Nat. Hist. III, 40; Terr. Moll. II, 331, pl. lxxii, f. 8.—PFEIFFER, Mon. Hel. Viv. III, 556.—W. G. BINNEY, Terr. Moll. IV, 146.

East Florida.

Pupa pentodon, SAY.—Shell subperforate, of an elongated ovate form, minutely striated, and of a spermaceti, or whitish horn-color; whirls about five, well rounded, and separated by a deep suture; apex rather acute; aperture oblique, nearly semicircular; peristome sharp, and somewhat expanded, but not reflexed; the submargin of the throat is thickened by a ridge of white callus, on which the denticles are situated; one of these,

Fig. 405. Fig. 406.

Pupa pentodon.

and sometimes two, is on the parietal wall, two on the columellar portion of the peristome, and two constantly, and from one to five others occasionally, on the other portion of the peristome; of these, that near the middle of the parietal wall is largest, that at the upper part of the columellar is next, and one opposite the first, on base of the aperture, is the third in size. Length 2, diam. 1; of aperture, length ⅔ mill.

Vertigo pentodon, SAY, Journ. Acad. Nat. Sci. Phila. II, 376 (1822); ed. BINNEY, 27.

Pupa pentodon, GOULD, Bost. Journ. Nat. Hist. IV, 353, pl. xvi, f. 10, 11

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(1843).—DeKay, N. Y. Moll. 50, pl. iv, f. 48; pl. xxxv, f. 337 (1843).—Pfeiffer, Mon. Hel. Viv. II, 359; in Chemnitz, ed. 2, 125, pl. xvi, f. 24–26.—Binney, Terr. Moll. II, 328, pl. lxxii, f. 1.—W. G. Binney, Terr. Moll. IV, 143.

Pupa curvidens, Gould, Invertebrata, 189, f. 120 (1841).

Pupa tappaniana, Adams, Silliman's Journ. [1], XL, Suppl.; Shells of Vermont, 158 (1842).—Pfeiffer, Symbolæ, II, 55.

Leucochila pentodon, Morse, Journ. Portl. Soc. I, 36, f. 85; pl. x, f. 86 (1864); Amer. Nat. 667, f. 56 (1868).

From Georgia and Mississippi to the most northern portions of the Union. It is usually found at the foot of trees and under leaves.

Fig. 407.

Animal of *Pupa pentodon*.

Animal blackish above, light gray below; foot moderately long, the transverse fissure very distinct, the anterior portion having the mouth in the centre, and bilobate in front. Tentacles about one-third as long as the eye-peduncles. Very sluggish in its movements, and carries the shell nearly horizontally, or very slightly elevated.

An enlarged view of the aperture is given in Fig. 405.

Fig. 408.

Jaw of *Pupa pentodon*. [Morse.]

Jaw slightly arcuate, of uniform breadth, anterior surface longitudinally striate, concave margin minutely notched.

Fig. 409.

Lingual dentition of *Pupa pentodon*.

Lingual membrane with 64 rows of 21 (10—1—10) teeth; centrals with three subequal, very small cusps; laterals bicuspid, uncini serrate, the inner point much developed.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8707	3	.....	W. G. Binney.	Cab. series.
8797	20+	Massachusetts.	W. Stimpson.	.....

Pupa decora, Gould.—Shell minute, cylindrical, rounded at apex, thin, shining, translucent, of a wine-yellow color, regularly striated by lines of growth; spire of five or six closely revolving, rounded whirls, deeply separated at the sutures; aperture nearly round or semioval, obliquely limited by the penultimate whirl, armed with four slender denticles, the largest of them on the parietal wall, one on the columellar

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Fig. 410.

Pupa decora, enlarged.

portion of the peristome, and two on the outer portion, all disposed so as to form the arms of a cross; the peristome is slightly reflexed, and indented opposite the base of the two labial denticles; at the columella, it rises against a distinct umbilical perforation. Length 2½, diam. 1½ mill.

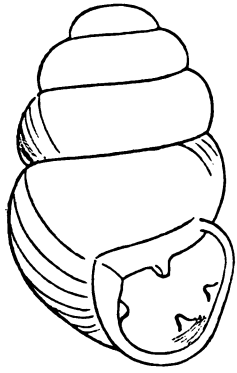
Pupa decora, GOULD, Proc. Bost. Soc. Nat. Hist. II, 263 (Dec. 1847), with a woodcut; in Terr. Moll. II, 327, pl. lxxi, f. 2.—PFEIFFER, Mon. Hel. Viv. III, 555.—W. G. BINNEY, Terr. Moll. IV, 143.

Near Lake Superior. Fort Resolution, Great Slave Lake (*Kennicott.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9079	6	British America.	Kennicott.	.....

Pupa. corpulenta, MORSE.—Shell rimate perforate, elongate ovate, finely striated, polished, translucent, dark olive brown; apex round, obtuse; whirls four, convex, tumid, wider at the base; aperture large, subcircular, with four obtuse teeth, one on the parietal margin, one on the columellar margin, and two on the labrum; peristome slightly thickened and reflected. Length .10 inch, breadth .06 inch. (*Morse.*)

Fig. 411.



Pupa corpulenta.

Isthmia corpulentæ, MORSE, Ann. N. Y. Lyc. VIII, 210, f. 7 (Nov. 1865).

Little Valley, Washoe Co., Nevada; on east slope of Sierra Nevada, 6500 feet above the sea.

Pupa rowellii, NEWCOMB.—Shell perforate, oblong-ovate, dark horn-colored, shining, translucent, finely striated; apex obtuse; whirls five, convex; aperture truncately ovate, armed with four teeth, one prominent and plicate on the columella, three deeply seated within the aperture, one on the columella, two within the peristome; peristome slightly reflected. Length 2, breadth 1 mill.

Fig. 412.

Pupa rowellii.

Pupa rowellii, NEWCOMB, Ann. N. Y. Lyc. VII, 146.—BLAND, Ann. N. Y. Lyc. VIII, 166, f. 11 (1865).

Near Oakland, California.

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Pupa californica, Rowell.—Shell rimately subperforate, elongate ovate, thin, dark horn-colored; with oblique rib-like striæ; apex obtuse; deep suture; with five to six convex whirls, the last a little compressed at the aperture; aperture oblique, suborbicular, armed with four white denticles; one lamelliform, strongly developed, slightly twisted, on the parietal wall, one on the columella, and two deeply seated within or near the base of the aperture; peristome slightly expanded, columellar margin somewhat reflected. Long. 2½, diam. 1 mill.

Fig. 413.

Pupa californica.

Pupa californica, Newcomb, Ann. N. Y. Lyc. VII, 287.—Bland, Ann. N. Y. Lyc. VIII, 166, f. 12 (1865).

San Francisco, California.

Subgenus **LEUCOCHILA,** Alb. & Mart.

Shell rimate, cylindrically ovate, apex rather obtuse; rather smooth, shining, pellucid; whirls 6–7, rather convex, aperture semioval, edentulate or narrowed by folds, among which the parietal is the strongest; peristome thickened, reflected, its external margin decidedly arcuate. Tentacles very distinct.

Pupa fallax, Say.—Shell fusiform, regularly diminishing in volume from the body-whirl to the apex, smooth; epidermis brownish horn-color; whirls six, very convex, striæ of growth hardly apparent; suture well impressed; aperture lateral, rounded oval; peristome white, rather broadly reflected, lined within with white callus, its right termination strongly curved; umbilicus perforated. Length 5½, diam. 2–2½; aperture 1⅝ mill long.

Fig. 414.

Pupa fallax, enlarged.

Cyclostoma marginata, Say, Journ. Acad. Nat. Sci. Phila. II, 172 (1821); Binney's ed. 22.

Bulimus marginatus, Pfeiffer, Mal. Blatt. II, 94; Mon. Hel. Viv. IV, 414.—W. G. Binney, Terr. Moll. IV, 136.

Bulimus fallax, Gould, in Terr. Moll. II, 288, pl. lii, f. 1.

Pupa fallax, Say, Journ. Acad. Nat. Sci. Philad. V, 121 (1825); Binney's ed. 28.—Gould, Invertebrata, 132, f. 123 (1841), excl. syn. *placida;* Bost. Journ. Nat. Hist. IV, 357, pl. xvi, f. 15 (1843).—DeKay, N. Y. Moll. 51, pl. xxxv, f. 331 (1843).—Pfeiffer, Mon. Hel. Viv. II, 309; III, 333; in Chemnitz, ed. 2, 58, pl. xii, f. 20, 21 (1844).

Pupa parraiana, D'Orbigny, Moll. Cuba, 181, pl. xii, f. 9–11 (1853).

Pupa albilabris, Adams, Vermont Mollusca, p. 158 (1842); Silliman's Journ. [1], XL, 271.

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Pupilla fallax, Morse, Amer. Nat. 609, f. 53 (1868).
Paludina turrita, Menke? Syn. Meth. 40.

From Nebraska to Texas and From New England to South Carolina. In several of the West India Islands.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8422	6	Washington, D. C.	W. Stimpson.	.....
8423	2	Kansas.	.....	.....
8424	3	Milwaukee, Wis.	I. A. Lapham.	.....
8391	5	.....	W. G. Binney.	Cab. series.

Pupa modica, Gould. — Shell small, delicate, elongated, ovate-conic, whitish or pale horn-colored, imperforate; whirls five, convex, the apex of the spire acute; aperture expanded, peristome revolute, but not flattened, its right-margin strongly curved above; throat destitute of teeth. Length 2¼, diam. 1⅓ mill.

Fig. 415.

Pupa modica, enlarged.

Pupa modica, Gould, Proc. Bost. Soc. Nat. Hist. III, 40 (1848); Terr. Moll. II, 318, pl. lii, f. 2.—W. G. Binney, Terr. Moll. IV, 142.—Pfeiffer, Mon. Hel. Viv. III, 533.
Bulimus modicus, Pfeiffer, Mon. Hel. Viv. IV, 414.

Georgia, Florida, and Alabama.

This species is very nearly allied, if not identical with *Pupa fallax*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8711	2	St. Simon's Isl., Ga.	W. G. Binney.	Cab. series.

Pupa arizonensis, Gabb.—Shell rimate, oblong-fusiform, thin, delicately wrinkled, pellucid, horn-color; spire elongated, apex obtuse; whirls five, convex, the last equalling one-half the shell's length; aperture oblique, oval; peristome thickened, white, continuously slightly reflected, its ends approximating, joined by a light callus, that of the columella straight, dilated. Length 4½, diam. 2; aperture 1½ long, 1 mill. wide.

Fig. 416.

Pupa arizonensis.

Pupa (Modicella) arizonensis, Gabb, Am. Journ. Conch. II, 331, pl. xxi, f. 6 (1866).

Arizona, at Fort Grant, junction of Arivapa and San Pedro Rivers.

The description and figure are drawn from an authentic specimen. The species is less elongated, more blunt, and has more convex whirls than *Pupa fallax*.

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Pupa hordeacea, GABB.—Shell rimate, cylindrical, thin, scarcely striate, pellucid, horn-color; spire elongated, apex obtuse; whirls five, convex, the last equalling one-third the shell's length; aperture truncate-ovate; peristome thickened, white, reflected, not continuous; one twisted, tooth-like, entering, prominent fold upon the parietal wall of the aperture, and one prominent upright tooth within the aperture at its base. Length 2½, diam. ¾ mill.

Fig. 417.

Pupa hordeacea.

Pupa hordacea, GABB, Am. Journ. Conch. II, 331, pl. xxi, f. 7 (1866).

Arizona, at Fort Grant, junction of Arivapa and San Pedro Rivers.

My description and figure are drawn from an authentic specimen.

Pupa chordata, PFEIFFER.—Shell rimate, cylindrically oblong, thin, marked with oblique, somewhat separated cord-like ribs; pellucid, horn-colored; spire elongate, apex obtuse; whirls five and a half, moderately convex, the last hardly surpassing one-fourth the shell's length, rounded at the base; aperture oblique, oval; peristome thickened, white, slightly reflected in its whole length, its extremities approaching, the columellar slightly arched. Length 4, diam. 1 mill.; of the aperture scarcely 1 long.

Fig. 418.

Pupa chordata, enlarged.

Bulimus chordatus, PFEIFFER, Mal. Blatt. III, 46; Mon. Hel. Viv. IV, 420.

Mazatlan.

The specimen figured was received from Dr. Pfeiffer.

Pupa armifera, SAY.—Shell cylindrical, subfusiform, smooth; whirls six to seven, convex, the three next the aperture of about equal diameter, the posterior three diminishing and forming a rather obtuse apex; suture impressed; peristome white, thin, subreflected, forming the whole outline of the aperture, except a small portion of the body-whirl, where a thin, testaceous deposit connects its two extremities; aperture lateral, nearly oval, deep, cup-shaped, and narrowing towards the throat, which is almost filled up by projecting teeth; white within; teeth commonly four, one of which, affixed to the body-whirl, commences at the superior margin of the aperture, near the junction of the peristome and ulti-

Fig. 419.

Pupa armifera, enlarged.

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mate whirl, and runs backward and downward into the aperture, it is prominent, lamelliform, irregular, has one or more sharp, projecting points, and is sometimes bifid; another, thick and massive, is situated deep in the throat, and marks internally the place of the umbilicus; and two others, projecting and tooth-like, are placed on the peristome at the base of the aperture, and point towards the centre of the aperture; base of the shell, from the umbilicus to the edge of the aperture, compressed, forming a short and obtuse keel; umbilicus a little expanded, and slightly perforate. Length 4⅔ mill., diam. 2⅔; length of aperture 1¾.

Pupa armifera, Say, Journ. Acad. Nat. Sci. Philad. II, 162 (1821); Binney's ed. 21.—Gould, Bost. Journ. Nat. Hist. III, 400, pl. iii, f. 10 (1840); IV, 359 (1843).—Adams, Vermont Mollusca, 157 (1842); Silliman's Journ. [1], XL, 271.—Pfeiffer, Symbolæ, II, 53; Mon. Hel. Viv. II, 357.—DeKay, N. Y. Moll. 52 (1843).—Binney, Terr. Moll. II, 320, pl. lxx, f. 4.—Küster, in Chemnitz, ed. 2, 57, pl. vii, f. 17-19.—W. G. Binney, Terr. Moll. IV, 142.

Pupa rupicola, Pfeiffer, Symbolæ, II, 55, teste Pfeiffer, in Mon.

Leucochila armifera, Morse, Amer. Nat. 667, f. 55 (1868).

Pupa armigera, Potiez et Michaud, Galerie, I, 159, pl. xvi, f. 1, 2.

Probably inhabits every State east of the Rocky Mountains.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8403	90	Kansas.	.....	.....
8406	8	Columbus, Ohio.	Dr. J. Lewis.	.....
8407	9	Marietta, Ohio.	W. Holden.	.....
8408	4	Milwaukee, Wis.	I. A. Lapham.	.....
8409	50	Washington, D. C.	W. Stimpson.	.....

Pupa contracta, Say.—Shell subconical; epidermis whitish horn-color; whirls between five and six, very convex, diminishing regularly from the last whirl, which is somewhat ventricose, to the apex; suture well impressed; peristome white, thickened, somewhat reflected, its ex-

Fig. 420.

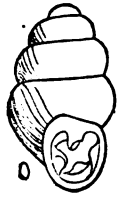
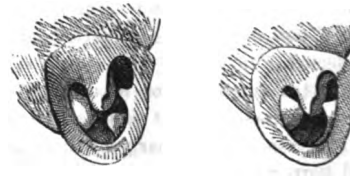


Fig. 421.



Pupa contracta, Say.

tremities connected by a raised, testaceous fold, making the margin of the aperture entire; aperture lateral, rather triangular or trilobate, more than

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half as wide as the body-whirl, expanded above and diminishing regularly into a very narrow throat, with four teeth, one upon the columella, large, coarse, and irregular, projecting into and very much filling up the aperture, and having a concavity on the side towards the peristome; another tuberculous, not large, more or less near the margin of the peristome; and two others, massive and prominent, deep seated in the throat, one being in the base behind the columellar tooth, and the other on the side of the umbilicus and apparently produced by the umbilical fold; umbilicus with a minute perforation; base of the shell with a sharp keel between the umbilicus and margin; last whirl impressed behind the peristome. Length 3, diam. 1¼; of aperture, length 1 mill.

Pupa contracta, Say, Journ. Acad. Nat. Sci. Philad. II, 374 (1822); Binney's ed. 25 (*Caryckium?*).—Gould, Bost. Journ. Nat. Hist. III, 399, pl. iii, f. 22 (1840); IV, 359 (1843); Invertebrata, 186, f. 117 (1841).—DeKay, N. Y. Moll. 49, pl. iv, f. 47 (1843).—Adams, Vermont Mollusca, 157.—Pfeiffer, Symbolæ, II, 54; Mon. Hel. Viv. II, 356.—Küster, in Chemnitz, 2d ed. 96, tab. xiii, f. 16–18.—Binney, Terr. Moll. II, 324, pl. lxx, f. 2.—W. G. Binney, T. M. IV, 143.

Pupa corticaria, Pfeiffer, Symbolæ, II, 54 (an var. β? Pfeiffer, *l. c.*).

Pupa deltostoma, Charpentier, in Chemnitz, ed. 2, p. 181, pl. xxi, f. 17–19.—Pfeiffer, Mon. Hel. Viv. IV, 683.

Leucochila contracta, Morse, Amer. Nat. 666, f. 54 (1868).

Fig. 422.

Pupa deltostoma.

Inhabits the whole of Eastern North America.

Fig. 422 is a fac-simile of the original figure of *Pupa deltostoma*, which appears identical with *P. contracta*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8412	33	Mohawk, N. Y.	Dr. J. Lewis.	.....
8696	17	" "	"	Cab. series.

Pupa rupicola, Say.—Shell cylindrical, elongated; epidermis brownish horn-color; whirls six, convex, the three anterior ones of nearly equal diameter, the three posterior diminishing very slightly, and forming an obtuse apex; suture deep; peristome brownish, thickened within, widely reflected; aperture lateral, semicircular, truncated above by the body-whirl; teeth five, one on the middle of the columella prominent, compressed, emarginate in the middle, and often bicuspid; another at the termination of the axis, marking internally the situation of the umbilicus, conical, and often composed of two or more tubercles; a third in the base of the aperture, a fourth upon the peristome, and a fifth, often massive

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Fig. 423. Fig. 424.

Pupa rupicola, enlarged.

and prominent, deep in the fauces behind the columellar tooth; umbilicus minute. Length 2½, diam. 1 mill.

Pupa rupicola, SAY, Journ. Acad. Nat. Sci. Phila. II, 163 (1821); BINNEY's ed. 22 (*Carychium?*).—GOULD, Bost. Journ. Nat. Hist. IV, 355, pl. xvi, f. 13 (1843).—PFEIFFER, Mon. Hel. Viv. II, 358; III, 557, nec Symbolæ, II, 55; in CHEMNITZ, ed. 2, p. 123, pl. xvi, f. 17–19.—DEKAY, N. Y. Moll. 52 (1843).—BINNEY, Terr. Moll. II, 341, pl. lxx, f. 1.—W. G. BINNEY, Terr. Moll. IV, 145.

Pupa procera, GOULD, Bost. Journ. Nat. Hist. III, 401, pl. iii, f. 12 (1840).—KÜSTER, in CHEMNITZ, 58, pl. vii, f. 20, 21.—PFEIFFER, Mon. Hel. Viv. II, 360.

Pupa carinata, GOULD (olim), 1842, Bost. Journ. Nat. Hist. IV, 1, cover, p. 3; see also IV, 359 (1843).—PFEIFFER, Mon. Hel. Viv. II, 359; III, 557.

Pupa gibbosa, KÜSTER, in CHEMNITZ, ed. 2, p. 123, pl. xvi, f. 13–16.

Pupa minuta (SAY), PFEIFFER, Mon. Hel. Viv. II, 356; III, 555; Symb. II, 54.

Vertigo rupicola, BINNEY, *l. c.*

From Key West to Arkansas and New England.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8708	3	Baltimore, Md.	W. G. Binney.	Cab. series.

Pupa corticaria, SAY.—Shell whitish, shining, cylindrical, obtuse at the apex; whirls rather more than five, convex; suture well impressed; aperture lateral, two-thirds as wide as the last whirl, suborbicular, with a single tooth (sometimes two) on the parietal wall, near the centre, and a tooth-like enlargement near the umbilical termination of the peristome, which is white, reflected; umbilicus very minutely perforated. Length 2½, diam. 1 mill.

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Fig. 425. Fig. 426.

Pupa corticaria.

Odostomia corticaria, Say, Nich. Encycl. IV, pl. iv, f. 5; ed. 1 (1817); ed. 2 (1818); Binney's ed. 7, pl. lxxii, f. 5.

Pupa corticaria, Say, Nich. Encycl. IV, ed. 3, 1819, pl. iv, f. 5.—Gould, Bost. Journ. Nat. Hist. III, 397, pl. III, f. 19 (1840); IV, 358 (1843).—DeKay, N. Y. Moll. 50, pl. iv, f. 49 (1843).—Küster, in Chemnitz, 2d ed. p. 27, tab. xiii, f. 19–20.—Pfeiffer, Mon. Hel. Viv. II, 328.—Binney, Terr. Moll. II, 339, pl. lxxii, f. 4.—W. G. Binney, Terr. Moll. IV, 146.

Carychium corticaria, Ferussac, Prodr. no. 3 (no descr.).

Leucochila corticaria, Morse, Journ. Portl. Soc. I, 36, f. 87; pl. x, f. 88 (1864).

From Maine and Wisconsin to South Carolina and Mississippi.

Jaw slightly arcuate, tapering towards the pointed ends, the centre of the anterior surface marked with longitudinal striæ; concave margin with a slight, broad, median projection.

Fig. 427.

Jaw of *Pupa corticaria*. [Morse.]

Lingual membrane with ? rows of teeth, twenty-five (12—1—12) in each row. Central teeth very small, tricuspid, laterals bicuspid, modified into serrated uncini.

Fig. 428.

Lingual dentition of *Pupa corticaria*. [Morse.]

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Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8413	1	Milwaukee, Wis.	I. A. Lapham.	.....
8706	1	.....	W. G. Binney.	Cab. series.

Pupa pellucida, PFR. — Shell subperforate, cylindrical, thin, pellucid, shining, pale yellow, spire somewhat attenuated, apex obtuse; whirls five, convex, the last flatter than the penultimate; aperture semi-oval, with five teeth; single strong teeth on columella and parietal wall of aperture, two moderate ones on right side, a fifth small basal one within the aperture; peristome simple, its right end expanded, its columellar end reflected. Length 2, diam. scarcely 1 mill.; aperture scarcely ⅔ mill. long.

Fig. 429.

Pupa pellucida.

Pupa pellucida, PFEIFFER, Symbolæ, I, 46 Mon. Hel. Viv. II, 360; in RÖSER's Texas, 456.—KÜSTER, in CHEMNITZ, ed. 2, 89, pl. xii, f. 24, 25.—W. G. BINNEY, Terr. Moll. IV, 147.

Pupa servilis, GOULD, Bost. Journ. Nat. Hist. IV, 356, pl. xvi, f. 14.—PFEIFFER, Mon. Hel. Viv. II, 360.

Pupa rüsei, PFEIFFER, olim, Mon. Hel. Viv. III, 532.—KÜSTER, in CHEMNITZ, ed. 2, 176, pl. xxi, f. 13, 14.

A Cuban species quoted by Pfeiffer from Texas. I have seen no specimens of it. Fig. 429 is a fac-simile of that of *P. servilis*.

SUBGENUS STROPHIA, Albers.

Shell rimate, cylindrical or oblong-ovate, perpendicularly costulate or ribbed, solid, white, often variegated with red; whirls 9–12, the last narrowed towards the base, often ascending; aperture semioval, usually bluish-brown within; columella with a dentiform fold, parietal wall furnished with an internal denticle; peristome thickened, reflexed, its margins connected by a somewhat heavy callus.

Animal (of *P. incana*) whitish, brownish, smoky, or nearly black, darker on the back and upper part of head. Body finely granulated, the granules arranged in regular lines longitudinally, making the surface look as if minutely and longitudinally furrowed. Eye-peduncles rather short, slender, bulbous at the extremities, tentacles very short.

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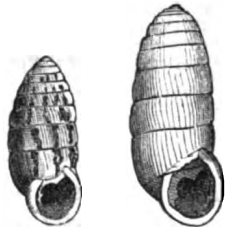
Pupa incana, Binney.—Shell deeply rimate, cylindrically-oblong, solid, smooth or delicately striate, shining, chalky; spire elongate, gradually attenuated into a rather acute cone; suture light, margined; whirls eleven, flat, very gradually increasing, the last scarcely equalling or shorter than the length, wrinkled anteriorly, more or less arcuately ascending, at base subcompressed; aperture small, roundly-lunate, light flesh color within, furnished with a moderate deeply seated parietal tooth and an obsolete columellar fold; peristome somewhat thickened, shortly reflected all round, its terminations joined by a thin callus, that of the columella dilated and arched above. Length 26, diam. 10; of aperture, length 8–9, diam. 7–8 mill.

A variety has irregular longitudinal streaks of reddish-brown.

Fig. 430.



Pupa incana.

Pupa incana, Binney, Terr. Moll. I, 109; III, pl. lxviii.—Leidy, T. M. U. S. I, pl. xv, f. 2–4, anat.—Pfeiffer, Mal. Blatt. II, 13; Mon. Hel. Viv. IV, 657.—W. G. Binney, Terr. Moll. IV, 140, pl. lxxix, f. 17.

Pupa mumia, Potiez and Michaud, Gal. I, 169, pl. xvii, f. 1–2 (teste Pfr.).

Pupa maritima, γ, Pfeiffer, Mon. Hel. Viv. III, 539.—Gould, in Terr. Moll. II, 316.

Pupa detrita, Shuttleworth, MS., Pfeiffer, in Mal. Blatt. I, 158 (1853); I, 205 (1854), pl. iii, f. 9, 10.

A Cuban species found on the Florida Keys. It is found on saline plants a few inches from the soil on low grounds near salt-water ponds.

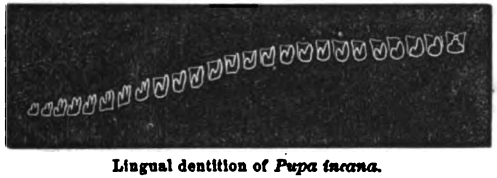
Fig. 431.

Jaw of *Pupa incana.*

The jaw (Fig. 431) is strongly arcuate, of uniform width, ends square; anterior surface striate; concave edge with a blunt median projection.[1]

Lingual membrane[2] with 129 rows of 49 teeth

Fig. 432.



Lingual dentition of *Pupa incana.*

[1] The jaw figured was extracted by myself from a specimen in alcohol. That figured in Terr. Moll. I, pl. xv, f. 4, is quite different.

[2] The figure of the lingual dentition referred to this species in the second volume of the Terrestrial Mollusks represents that of *Macrocyclis concava.*

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(24—1—24); central with a median cusp and two blunt obsolete cusps at its side; lateral teeth bicuspid; uncini serrate.

Some individuals have also internal denticles in the upper whirls (see Pfeiffer, Mal. Blatt. 1859, 209, pl. ii, f. 1–3).

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8414	4	Key Biscayne, Fla.	G. Wurdemann.	.....
8695	3	" "	"	Cab. series.

Doubtful and Spurious Species of Pupa.

Pupa placida, Say, is probably an accidentally introduced specimen of *Buliminus obscurus*, Müller (see Boston Proc. I, 105). The original description here follows:—

Shell dextral, cylindric-conic, pale yellowish horn-color; apex whitish, obtuse; whirls six and a half, somewhat wrinkled; suture moderately impressed; aperture unarmed, longitudinally oval, truncate a little obliquely above by the penultimate volution; columella so recurved as almost to conceal the umbilicus; labrum, with the exception of the superior portion, appearing a little recurved when viewed in front, but when viewed in profile, this recurvature is hardly perceptible; umbilicus very narrow.

Length over three-tenths of an inch. Inhabits Massachusetts.

For this shell I am indebted to Dr. T. W. Harris, of Milton, from whom I have received many interesting species of our more northern regions. At first view it might be mistaken for the *P. marginata*, Nob., but it is quadruple the size, and the labrum is not reflected and thickened. (*Say.*)

Pupa placida, Say, New Harmony Diss. II, 230 (1829); Descr. 24 (1840); Binney's ed. 39.—W. G. Binney, Terr. Moll. IV, 145

Pupa fallax, DeKay, N. Y. Moll. 51.—Gould, Invert. 192.

Pupa fallax, β, Pfeiffer, Mon. Hel. Viv. II, 309.

Bulimus hordeanus? DeKay, *l. c.*—Binney, Bost. Proc. I, 105.

Bulimus obscurus, Gould, Mon. Pupa, p. 17.—Pfeiffer, III, 350, on DeKay's authority.

Pupa costulata, Michels, is the same as *Helix harpa*.

Pupa exigua, Say, &c., is the same as *Carychium exiguum*.

Pupa gouldii, Binney, &c., is the same as *Vertigo gouldii*.

Pupa milium, Gould, is the same as *Vertigo milium*.

Pupa modesta, Say, &c., is the same as *Vertigo ovata*.

Pupa ovata, Gould, &c., is the same as *Vertigo ovata*.

Pupa ovulum, Pfeiffer, is the same as *Vertigo ovata*.

Pupa simplex, Gould, &c., is the same as *Vertigo simplex*.

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Pupa unicarinata, BINNEY, Terr. Moll. I, is the same as *Macroceramus kieneri*.

Pupa nebrascana, of WARREN'S Report of Surveys, &c. Ex. Doc. II, pt. 2, 35th Cong. 1859, p. 725, may perhaps be *P. contracta*.

FOSSIL SPECIES OF PUPA.

Pupa helicoides, MEEK & HAYDEN, Proc. Acad. Nat. Sci. Philad. VIII, 118.

Pupa vetusta, DAWSON, Geol. Soc. Proc. 1852, IX, 60, pl. iv (*Dendropupa*, OWEN).

VERTIGO, MCLL.

Shell deeply rimate, ovate, apex acuminate obtuse; whirls 5–6, the last rounded; aperture semioval, with four to seven folds; peristome scarcely expanded, white-lipped

Fig. 433.

Jaw of *Vertigo ovata*. [MORSE.]

Tentacles wanting.

Jaw smooth or with longitudinal wrinkles, subrostate.

Lingual membrane broad, central teeth tricuspid, laterals bicuspid or serrate, uncini serrate.

Fig. 434.

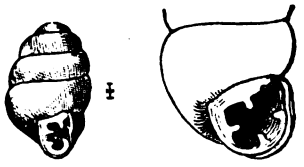
Lingual dentition of *Vertigo ovata*. [MORSE.]

SUBGENUS ISTHMIA, Gray.

Shell dextral.

Vertigo gouldii, BINNEY.—Shell light chestnut, cylindrical ovate; whirls rather more than four, ventricose, the last occupying nearly one-half the length of the axis; aperture lateral, composed of two unequal curves meeting in the centre of the peristome, with five prominent, white teeth, namely, one upon the transverse margin, two upon the umbilical margin, and two upon the labial

Fig. 435.



Vertigo gouldii.

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margin; peristome thickened, not reflected; umbilicus a little open. Length 2, diameter 1 mill.; aperture ⅔ long.

Pupa gouldii, BINNEY, Proc. Bost. Soc. Nat. Hist. I, 105 (1843); Terr. Moll. II, 332, pl. lxxi, f. 2.—GOULD, Bost. Journ. Nat. Hist. IV, 352, pl. xvi, f. 9 (1843).—PFEIFFER, Mon. Hel. Viv. II, 358; KÜSTER in CHEMNITZ, ed. 2, 124, pl. xvi, f. 20–23.

Vertigo gouldii, STIMPSON, Shells of N. E. 53 (no descr.).—W. G. BINNEY, Terr. Moll. IV, 148.—MORSE, Amer. Nat. I, 669, f. 60 (1868).

Isthmia gouldii, MORSE, Journ. Portl. Soc. I, 38, f. 95, pl. x, f. 96 (1864).

From Maryland through New England.

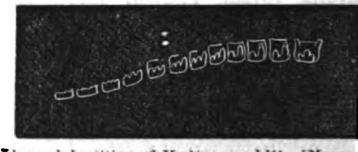
Fig. 436.

Jaw of *Vertigo gouldii*. [MORSE.]

Jaw scarcely arcuate, of equal size throughout, ends rounded, anterior surface with longitudinal lines and transverse striæ; concave margin simple, no median projection.

Lingual membrane with 75 rows, each row containing 23 (11—1—11) short and stout teeth; centrals tricuspid; uncini serrated.

Fig. 437.



Lingual dentition of *Vertigo gouldii*. [MORSE.]

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
6415	50	Portland, Me.	Dr. J. Lewis.	Named by J. L.
6694	1	.....	.....	Cab. series.
8798	11	Massachusetts.	W. Stimpson.	Named by W. S.

Vertigo bollesiana, MORSE.—Shell minutely perforate, cylindrical ovate, delicately striated, subtranslucent; apex obtuse; suture well defined; whirls four, subconvex; aperture suborbicular, somewhat flattened on its outer edge; with five teeth, one prominent and rather curved on the parietal margin, two similar in form, the lower one the smaller, on the columellar margin, and two slightly elevated lamelliform teeth within and at the base; peristome subreflected and thickened. Length .035 inch; breadth .035 inch. (*Morse.*)

Fig. 438.

Vertigo bollesiana.

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Isthmia bollesiana, Morse, Ann. N. Y. Lyc. VIII, 209, f. 4–6 (Nov. 1865).
Vertigo bollesiana, Morse, Amer. Nat. I, 669, f. 63–64 (1868).

New England; New York; Virginia.

Buccal plate of the same width throughout, slightly rounded at the ends; cutting edge without projections, finely striated.

Fig. 439.

Jaw of *Vertigo bollesiana*. [Morse.]

Lingual membrane with 88 rows of (12—1—12) teeth; central and lateral plates notched at outer posterior corners; central plate square, widening posteriorly, armed with three minute denticles, central one largest; laterals having two minute denticles apart, outer denticle nearly obsolete; uncini scarcely notched.

Fig. 440.

Lingual membrane of *Vertigo bollesiana*. [Morse.]

Vertigo milium, Gould.—Shell very minute, subcylindrical, diminishing equally to both extremities; epidermis dark amber, or chestnut color; whirls five, rounded, very minutely striated, decreasing slightly to the apex, which is obtuse; suture deep; peristome white, slightly reflected; aperture lateral, half the width of the last whirl, within brownish, general shape semicircular, truncated abruptly and directly by the last whirl, a testaceous deposit upon which forms the transverse margin, and connects the two extremities of the peristome; circumference made up of two curves of different radius uniting in the peristome, where the junction causes an angle projecting inwards, the smaller curve comprising about one-fourth part, and forming the superior portion of the peristome; teeth six, two on the transverse margin, sharp, projecting, and tooth-like; one in the angle between the columellar and transverse margins, broad, massive, and prominent, with occasionally one or more tubercles about its base; one on the lower part of the columellar margin; two on the peristome, in the base of the aperture, and at the junction of the two curves; umbilicus rather wide. Length $\frac{1}{5}$, diam. $\frac{1}{8}$ mill.

Fig. 441.

Vertigo milium.

Pupa milium, Gould, Bost. Journ. Nat. Hist. III, 402, pl. iii, f. 23 (1840); IV, 359 (1843); Invertebrata, 187, f. 118 (1841).—DeKay, N. Y. Moll. 48, pl. iv, f. 44 (1843).—Adams, Vermont Mollusca, 157 (1842).—Pfeiffer, Mon. Hel. Viv. II, 362.—Binney, Terr. Moll. II, 337, pl. lxxi, f. 1.—Küster, in Chemnitz, ed. 2, 119, pl. xv, f. 39–42.

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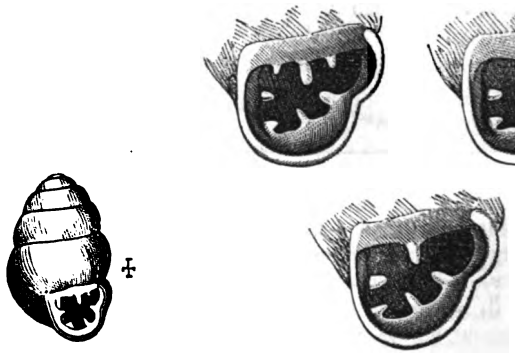
Vertigo milium, W. G. BINNEY, Terr. Moll. IV, 148.—MORSE, Amer. Nat. I, 669, f. 65, 66 (1868).

From New England to Texas.

Vertigo ovata, SAY.—Shell minute, ovate-conic, ventricose, dark amber-colored; whirls five, very convex, the last much inflated, diminishing rather rapidly to a somewhat acute apex, with an indentation towards the aperture; suture rather deep; peristome thin, somewhat expanded, with a groove behind and a thickening within; aperture in general outline semicircular, the curve consisting of segments of two different sized, but

Fig. 442. Fig. 443.



Vertigo ovata.

well defined circles, the smaller on the right at the junction of the peristome and body-whirl, comprising about one-fourth of the whole contour, and forming an angle at their junction; teeth generally six, two on the transverse margin, two on the columellar margin, the upper of which is massive, the lower pointed, and two on the peristome, in the base and at the junction of the two curves, sharp and prominent; umbilicus expanded. Length 3, diam. 1½ mill.; aperture 1 long.

Vertigo ovata, SAY, Journ. Acad. Nat. Sci. Philad. II, 375 (1822); ed. BINNEY, 26.—BINNEY, Terr. Moll. II, 334, pl. lxxi, f. 4.—W. G. BINNEY, Terr. Moll. IV, 148.—MORSE, Amer. Nat. I, 668, f. 57, 58 (1868).

Pupa ovata, GOULD, Bost. Journ. Nat. Hist. IV, 350, pl. xvi, f. 7, 8 (1843).—DEKAY, N. Y. Moll. 50, pl. iv, f. 50 (1843).—ADAMS, Vermont Mollusca, 157 (1842); Silliman's Journal, [1]. XL, 271.—KÜSTER, in CHEMNITZ, ed. 2, 118, pl. xiv, f. 1, 2; xv, f. 35, 38.—PFEIFFER, Mon. Hel. Viv. II, 360; Symbolæ, II, 54.

Pupa modesta, SAY, Long's Exped. II, 25, pl. xv, f. 5 (1824); ed. BINNEY, 32, pl. lxxiv, f. 5.—GOULD, Invertebrata, 188, f. 119 (1841).

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Pupa ovulum, PFEIFFER, olim, Symbolæ, I, 46.
Isthmia ovata, MORSE, Journ. Portl. Soc. I, 38, f. 93; pl. x, f. 94 (1864).

From Maine to Texas. Also quoted from Mexico and Cuba.

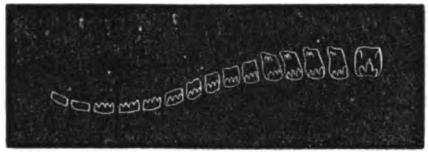
Jaw arcuate, of uniform breadth, ends square and horizontal; anterior surface with longitudinal wrinkles; concave margin simple, with a median projection.

Fig. 444.

Jaw of *Vertigo ovata*. [MORSE.]

Lingual membrane with 90 rows of twenty-nine teeth (14—1—14); centrals tricuspid, laterals and uncini serrated.

Fig. 445.

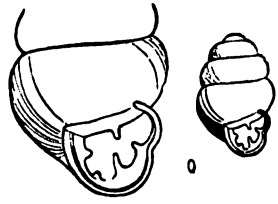


Lingual dentition of *Vertigo ovata*. [MORSE]

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8416	15	Massachusetts.	W. Stimpson.	.....
8417	30	Portland, Me.	Dr. J. Lewis.	.....
8418	4	Milwaukee, Wis.	I. A. Lapham.	.....
8693	7	Massachusetts.	W. Stimpson.	Cab. series.

Vertigo ventricosa, MORSE.—Shell umbilicate, ovate conic, smooth, polished; apex obtuse; suture deep; whirls four, convex; aperture semicircular, with five teeth, one prominent on the parietal margin, two smaller on the columellar margin, and two prominent within, contracting the aperture at the base; peristome widely reflected, the right margin flexuose, within thickened and colored. Length .07, breadth .045 inch. (*Morse.*)

Fig. 446.



Vertigo ventricosa.

Isthmia ventricosa, MORSE, Ann. N. Y. Lyc. VIII, 1, f. 1–3 (Nov. 1865).
Vertigo ventricosa, MORSE, Amer. Nat. I, 669, f. 61, 62 (1868).

Maine, New Hampshire, and New York.

I have not seen this species. Mr. Morse says it has been confounded with *V. ovata*, but is one-fourth smaller, has one

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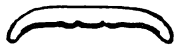
whirl less, and a more circular columellar margin to the aperture.

Fig. 447.



Jaw of *Vertigo ventricosa*. [MORSE.]

Buccal plate wide, narrow, not produced in centre, but slightly curving at ends; cutting edge regularly waved.

Lingual formula 98 (13—1—13); central and lateral plates notched at outer posterior corners; central plate square, having three small denticles; plate

Fig. 448.

Lingual membrane of *Vertigo ventricosa*. [MORSE.]

indented at base of central denticle, which is the largest; lateral plates tridentate, inner denticle largest; uncini minutely notched.

Vertigo simplex, GOULD.—Shell minute, cylindrical, obtuse at apex, smooth, chestnut color; whirls five, well rounded, separated by a deep suture; aperture circular, the peristome nearly continuous, simple or scarcely everted, except at its columellar margin, where it partially conceals a small umbilicus; no trace of a tooth has been detected in any specimen. Length 1¾ mill.; breadth half as great.

Fig. 449.

Vertigo simplex, enlarged.

Pupa simplex, GOULD, Bost. Journ. Nat. Hist. III, 403, pl. iii, f. 21 (1840); IV, 359 (1843); Invertebrata, 190, f. 121 (1841).—PFEIFFER, Mon. Hel. Viv. II, 302.—DEKAY, N. Y. Moll. 52, pl. xxxvi, f. 347 (1843).—BINNEY, Terr. Moll. II, 343, pl. lxxii, f. 3.

Vertigo simplex, STIMPSON, Shells of New England, 53 (no descr.).—W. G. BINNEY, Terr. Moll. IV, 148.—MORSE, Amer. Nat. I, 670, f. 67, 68 (1868).

Canada and New England.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8802	9	Massachusetts.	W. Stimpson.	Cab. series.

SPURIOUS SPECIES OF VERTIGO.

Vertigo contracta, ADAMS, Gen. Rec. Moll. is the same as *Pupa contracta*.
Vertigo decora, ADAMS, Gen. Rec. Moll. is the same as *Pupa decora*.
Vertigo minuta, ADAMS, Gen. Rec. Moll. is the same as *Pupa rupicola*.

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Vertigo pentodon, SAY, is the same as *Pupa pentodon*.
Vertigo rupicola, BINNEY, is the same as *Pupa rupicola*.
Vertigo corticaria, BINNEY, is the same as *Pupa corticaria*.

SUBFAMILY SUCCININÆ.

Jaw arcuate, at the convex edge lengthened into an additional nearly square plate, at its concave edge striated or ridged, with a short middle projection.

Lingual teeth in long, curving, transverse rows, centrals tricuspid, laterals bicuspid, uncini serrated.

SUCCINEA,[1] DR.

Shell imperforate, thin, ovate or oblong; aperture large, obliquely oval; columella simple, acute; peristome simple, straight.

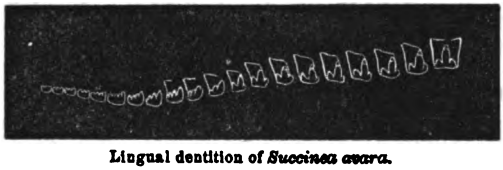
Jaw with a subquadrate plate attached to its convex margin; strongly arcuate, ends pointed; anterior surface smooth, or ridged; concave margin simple, with a rostriform median projection.

Fig. 450.

Jaw of *Succinea avara*. [MORSE.]

Lingual membrane with curving transverse series of teeth; centrals tricuspid; laterals bicuspid; uncini serrate.

Fig. 451.



Lingual dentition of *Succinea avara*.

SUBGENUS SUCCINEA, DR., S. STR.

Shell oblong, spire produced, whirls 3–4, convex, the last large, rounded, aperture oval.

[1] To follow strictly the law of priority, *Neritostoma*, Klein, should be used for this genus.

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Fig. 452.

Animal of *Succinea rusticana.*

Animal resembling the animal of *Helix*, but shorter. Eye-peduncles short, expanded at their base or conoid; tentacles very short and small. Respiratory foramen in the mantle, in the angle at the posterior part of the aperture of the shell.

Succinea haydeni, W. G. Binn.—Shell elongate-oval, thin, shining, amber-colored; spire short, acute; whirls three, convex, the last marked with the wrinkles of growth, and irregular, heavy, spiral furrows; suture moderate; columella covered lightly with callus, and allowing all the interior whirls to be seen from below to the apex; aperture oblique, oval, five-sevenths the length of the shell, the lower portion of its margin considerably expanded. Length 21, diam. 9 mill.

Fig. 453.

Succinea haydeni.

Succinea haydeni, W. G. Binney, Proc. Aca. Nat. Sci. Philad. X, 114 (May, 1858); Terr. Moll. IV, 40, pl. lxxix, f. 1.—Pfeiffer, Mal. Blatt. 1859, 52.—Bland, Ann. N. Y. Lyc. VIII, 168, f. 14 (1865).—Tryon, Am. Journ. Conch. II, 236, pl. ii, f. 20 (1866).

Nebraska, between the rivers Loup Fork and L'Eau qui Court.

Var. *minor*. Length 15 mill. Found by Mr. Robert Kennicott near the Red River of the North, and at Ft. Resolution, Great Slave Lake.

Cat. No.	No. of Sp	Locality.	From whom received.	Remarks.
8371	1	Big Sioux.	.....	.....
8659	1	Nebraska.	.....	Cab. series.
8660	3	N. Red River.	R. Kennicott.	"

Succinea retusa, Lea.—Shell ovate oblong, very thin, pellucid, yellowish; spire short; whirls three; aperture below dilate and drawn back. Diam. .3, length .7 inch. Ohio, near Cincinnati.

Fig. 454.

Succinea retusa.

A single specimen only of this species has come into my possession. It differs so much from any of the described species in the dilatation and retraction of the inferior part of the aperture, that I have not hesitated to consider it new. (*Lea.*)

Succinea retusa, Lea, Trans. Am. Phil. Soc. V, 117, pl. xix, f. 86 (1837); Obs. I, 229.—DeKay, N. Y. Moll. 55 (1843).—Pfeiffer, Mon. Hel. Viv. II, 525.—Binney,

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Terr. Moll. III, 65, 66.—W. G. Binney, Terr. Moll. IV, 37, pl. lxxix, f. 7.—Tryon, Am. Journ. Conch. II, 238, pl. ii, f. 25 (1866).

Succinea campestris, Anthony, Ohio Cat., no descr., part (1843), No. 95.

Mr. Lea's original description and figure are copied above.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8338	2	M. of Yellowstone.	.....	Named by Lea.
8654	1	" "	.....	Cab. ser. Named by [Lea.

Succinea sillimani, Bland.—Shell oblong-ovate, thin, coarsely striate, shining, whitish? spire short, acute; whirls three, convex; suture impressed; aperture oblique, elongate-oval, angular above, effuse at the base; columella slightly arcuate, with a thread-like thickening above. Long. 20, diam. 8½ mill.; aperture 13 mill. long, 6 broad in middle.

Fig. 455.

Succinea sillimani.

Succinea sillimani, Bland, Ann. N. Y. Lyc. VIII, 167, f. 13 (1865).—Tryon, Am. Journ. Conch. II, 236, pl. ii, f. 21 (1866).

Humboldt Lake, Nevada.

The original description and figure are given above.

Succinea ovalis, Gould, not Say.—Shell ovate, somewhat conic, very thin, pellucid, watery horn-color, sometimes tinted roseate; periostraca shining, very minutely striate; whirls three, the last compressed and elongate when viewed above; spire short but acute; suture impressed; aperture produced by a deep truncation of the shell, elongated, more than three-fourths the length of the shell, patulous, expanding anteriorly, exhibiting the interior of the volutions; when viewed on the side of the aperture, the conical shape of the shell appears, the broadest part of the cone is below the centre of the aperture, and it tapers gradually to the apex. Extreme length 15 mill., of aperture 10.

Fig. 456.

Succinea ovalis, Gould, not Say.

Succinea ovalis, Gould, Invertebrata, 194, f. 125 (1841).—Adams, Shells of Vermont, 270.—Binney, Terr. Moll. II, 78, pl. lxvii, a, f. 3.—W. G. Binney, Terr. Moll. IV, 37.—Pfeiffer, Mon. Hel. Viv. IV, 814.—Morse, Journ. Portl. Soc. I, 30, f. 77; pl. ix, f. 78 (1864); Amer. Nat. I, 607, f. 48 (1868).—Tryon, Am. Journ. Conch. II, 237, pl. ii, f. 22 (1866).—Not of Say.

Succinea decampii, Tryon, Am. Journ. Conch. II, 237, pl. ii, f. 23 (1866).

Canada and the Northern and Middle States.

17 January, 1869.

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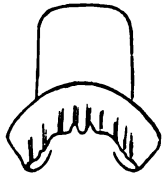
This is not the *S. ovalis* of Say. That shell having been found identical with *S. obliqua*, Dr. Gould proposes retaining the name *ovalis* for this species.

Animal a little longer than the shell, whitish or amber-colored, and translucent, with minute black dots, scattered and in clusters of dots upon the surface, most frequent upon the head and upper part of neck. Foot free from dots. A black line running from the ocular points of the eye-peduncles through their length, and along the sides of the neck to the shell, marking the sheath of the eye-peduncles, which are rather short, thick at base, attenuated towards the end, bulb distinct; tentacles short, small, and rather conical. Respiratory cleft near the peristome of the shell, about midway between its centre and its junction with the last whirl.

Fig. 457.



Jaw of *Succinea ovalis*. [MORSE.]

Jaw arcuate, ends blunt; anterior surface with strong vertical furrows, which modify the concave margin.

Lingual membrane with eighty rows of (40—1—40) teeth; teeth small in proportion

Fig. 458.

Lingual dentition of *Succinea ovalis*. [MORSE.]

to the plates on which they rest; centrals with three small denticles, laterals bidentate; uncini serrated.

Cat. No	No. of Sp	Locality.	From whom received.	Remarks.
6389	6	Milwaukee, Wis.	I. A. Lapham.	.....
6390	1	Illinois.	.....	.....
6391	2	Minnesota.	I. A. Lapham. [land.	.....
6392	43	Sing Sing, N. Y.	Rev. R. J. W. Buck-	.....
6393	3	Milwaukee, Wis.	I. A. Lapham.	.....
6394	19	Mohawk, N. Y.	Dr. J. Lewis.	.....
8653	5	.....	W. G. Binney.	Cab. series.

Succinea higginsi, BLAND.—Shell depressed-oval, thin, obliquely striated, pellucid, somewhat shining, pale horn-colored; spire short,

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obtuse; suture deep; whirls three, convex, the last rather depressed; the columella scarcely arched, above conspicuously plicate; aperture angularly oval, frequently armed with a small, oblique, white tooth on the parietal wall; peristome simple, regularly arcuate. Length 15, diam. 7 mill.; aperture 11 mill. long.

Fig. 459.

Succinea higginsi.

Succinea higginsi, Bland, Am. Journ. Conch. II, 373, pl. xvii, f. 24 (1866).—Tryon, Am. Journ. Conch. II, 237, pl. ii, f. 24 (1866).

Put-in-Bay Island, Lake Erie.

Succinea haleana, Lea.—Shell obliquely ovate, shining, somewhat transparent, thin, golden color; spire short; sutures impressed; whirls three, convex; aperture large, broadly oval; outer lip regularly expanded; columella incurved. Diam. .17, length .23 inch. Alexandria, La. (*Lea.*)

Fig. 460.

Succinea haleana.

Succinea haleana, Lea, Proc. Acad. Nat. Sci. Philad. 1864, 109.—Tryon, Am. Journ. Conch. II, 241, pl. ii, f. 34 (1866).

Succinea halei, Lea, Journ. Acad. Nat. Sci. Philad.; Obs. XI, 136, pl. xxiv, f. 110.

Mr. Lea's original description is given above. Fig. 460 is drawn from a specimen received from him.

Succinea mooresiana, Lea.—Shell obliquely oval, minutely striate, opaque, whitish, somewhat thin; spire exserted; sutures impressed; whirls three, a little convex; aperture nearly round; outer lip expanded; columella incurved and twisted. Diam. .24, length .39 inch. Court House Rock on Platte River. (*Lea.*)

Fig. 461.

Succinea mooresiana.

Succinea mooresiana, Lea, Proc. Acad. Nat. Sci. Philad. 1864, 109; Journ. of same, pl. xxiv, f. 109; Obs. XI, 136, pl. xxiv, f. 109.—Tryon, Am. Journ. Conch. II, 235, pl. ii, f. 17 (1866).

The above is Mr. Lea's original description. Fig. 461 is drawn from a specimen furnished by him.

Succinea grosvenorii, Lea.—Shell obliquely ovate, striate, somewhat transparent, straw-yellow, and thin; spire exserted; sutures very much impressed; whirls four, convex; aperture nearly round, and rather large; outer lip expanded; columella bent in and twisted. Diam.

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Fig. 462. .32, length .51 inch. Santa Rita Valley, Kansas? and Alexandria, Louisiana.

Succinea grosvenorii.

Succinea grosvenorii, LEA, Proc. Acad. Nat. Sci. Philad. 1864, 109; Journ. Acad. Nat. Sci. Philad. pl. xxiv, f. 108; Obs. XI, 135, pl. xxiv, f. 108.—TRYON, Am. Journ. Conch. II, 232, pl. ii, f. 9 (1866).

Succinea forsheyi, LEA, Proc. Acad. Nat. Sci. Philad. 1864, 109; Journ. of same; Obs. XI, 134, pl. xxiv, f. 107.—TRYON, Am. Journ. Conch. II, 239, pl. ii, f. 28 (1866).

The original description of this species is given above and a figure of an authentic specimen. The same is given below of *S. forsheyi*, which appears to me identical.

Fig. 463.

Succinea forsheyi.

Succinea forsheyi.—Shell obliquely elongate, smooth, polished, semitransparent, pale golden color, very thin; spire exserted, pointed; sutures impressed; whirls three, a little convex; aperture large, wide ovate; outer lip somewhat expanded; columella thin, incurved and twisted. Diam. .23, length .46 inch. Rutersville, Texas. (*Lea.*)

Succinea wilsoni, LEA.—Shell obliquely elongate, very much striate, transparent, deep golden color, and somewhat large, ovate; outer lip somewhat expanded; columella thin, incurved and twisted. Diam. .30, length .66 inch. Darien, Ga. (*Lea.*)

Fig. 464.

Succinea wilsoni.

Succinea wilsoni, LEA, Proc. Acad. Nat. Sci. Philad. 1864, 109; Journ. of same; Obs. XI, 133, pl. xxiv, f. 105.—TRYON, Am. Journ. Conch. II, 239, pl. ii, f. 27 (1866).

I have not seen this species. The original description and a fac-simile of the original figure are given above.

Succinea concordialis, GOULD.—Shell obliquely ovate, elongate, reflexed, apex acute, thin but firm, transparent, shining, feebly striated lengthwise and spirally, color pale honey-yellow, with the tip ruddy; whirls three and somewhat more, very oblique, the two uppermost very small, outer whirl somewhat compressed above the middle; suture well marked; aperture ample, not less than two-thirds the length of the shell, well rounded at base; columella regularly arcuated, more so than the peristome, simple, but its upper portion is reflexed and raised so as to form a marginal wall to the aperture, as

Fig. 465.

Succinea concordialis.

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it enters the shell, and produces a slight fold where it disappears within the spire; a broad, thin callus covers the left margin, which is slightly detached anteriorly, so as to form the rudiment of an umbilicus. Length 14, of aperture 9 mill.

Succinea concordialis, GOULD, Proc. Bost. Soc. Nat. Hist. III, 37 (June, 1848); in Terr. Moll. II, 82, pl. lxvii, a, f. 2.—PFEIFFER, Mon. Hel. Viv. III, 16.—W. G. BINNEY, Terr. Moll. IV, 41.—TRYON, Am. Journ. Conch. II, 239, pl. ii, f. 29 (1866).

Succinea munita, BINNEY, Terr. Moll. I, in tables.

Lake Concordia, in Texas.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks
8664	2	Lake Concordia, La.	W. G. Binney.	Cab. series.

Succinea luteola, GOULD.—Shell of a conical, turreted form, sometimes rather corpulent, and again quite slender, the last whirl being much less ventricose in proportion than the upper ones, rather thick in substance; color, when young, pale yellowish-green or drab, becoming bleached or gray with age, the interior, however, sometimes having the bright yellow of yelk of egg, and always more or less tinted thus when living, becoming at last dead white; surface irregularly and loosely wrinkled; whirls four, forming a well-proportioned spire, the upper ones well rounded, and separated by a deep suture, the apex acute, colored yellow; last whirl conical at its upper third; aperture ovate, rather more than half the length of shell, the columellar extremity of the peristome somewhat incumbent; columella without a fold, rounded, its edge above being seen winding far within the spire. Length 12½, breadth 6 mill.

Fig. 466.

Succinea luteola.

Succinea luteola, GOULD, Proc. Bost. Soc. Nat. Hist. June, 1848, III, 37; Terr. Moll. II, 75 pl. lxvii, c, f. 1 (1851).—W. G. BINNEY, Terr. Moll. IV, 41.—TRYON, Am. Journ. Conch. II, 239, pl. ii, f. 30 (1866).—PFEIFFER, Mon. Hel. Viv. III, 16.

Succinea texasiana, PFEIFFER, olim, Mon. Hel. Viv. II, 526; in ROEMER's Texas, 456 (1849); in CHEMNITZ, ed. 2, 42, pl. iv, f. 21–23 (1854).

Succinea citrina, SHUTTLEWORTH, undescribed, teste PFR.

Florida and Texas.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8379	11	Tamaulipas, Mex.	Lieut. Couch.	.....
8380	19	Texas.	"	.....
8657	3	"	"	Cab. series.

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Succinea lineata, W. G. BINN.—Shell oblong-ovate, with three very convex whirls; spire elevated, acute; surface marked with irregular wrinkles of growth, between which are coarse parallel revolving lines, somewhat removed from each other; aperture large, about as long as one-half of the whole length of the shell, oval; columella folded; a deposition of callus on the parietal wall of the aperture. Greatest diam. 6, alt. 12 mill.

Fig. 467.

Succinea lineata.

Succinea lineata, W. G. BINNEY, Proc. Acad. Nat. Sci. Philad. 1857, 19; Proc. Bost. Soc. Nat. Hist. VI, 155 (April, 1857); Terr. Moll. IV, 38, pl. lxxx, f. 5.—TRYON, Am. Journ. Conch. II, 235, pl. ii, f. 16 (1866).

Fort Union, Nebraska Territory.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8372	9	Ft. Union. [Union.	.....	Type.
8373	6	Bet. Pike Lake and Ft.	Gov. J. J Stevens.	.....
8374	5	M. of the Yellowstone.	.....	.....
8375	1	Utah.	.....	.....
8376	1	Platte River, Neb.	.....	.....
8376	1	Loup Fork.	.....	.....
8377	7	Apple Creek, lat. 47°?	.....	.....
8378	1	Grindstone Creek.	.....	.....
8658	4	Yellowstone River.	.....	Cab. series.
8806	5	Ft. Union.	.....	.....

Succinea avara, SAY.—Shell rather small, very thin and fragile, straw-colored, rosy, amber-colored or greenish; periostraca shining, or presenting minute hairy processes in the young; whirls three, very convex, separated by a deep suture; last whirl rather large, not much expanded; spire very prominent, acute; aperture ovate, rounded at both extremities, about half as long as the shell. Extreme length about 6 mill.

Fig. 468.

Succinea avara, enlarged.

Succinea avara, SAY, Long's Exped. II, 260, pl. xv, f. 6 (1822); BINNEY'S ed. 32, pl. lxxiv, f. 6.—GOULD, Invertebrata, 196, f. 127 (1841).—ADAMS, Shells of Vermont, 156 (1842).—DEKAY, N. Y. Moll. 54, pl. iv, f. 55 (1843).—PFEIFFER, Symbolæ, II, 56; Mon. Hel. Viv. II, 525; in CHEMNITZ, ed. 2, 51, pl. v, f. 18–20 (1854).—BINNEY, Terr. Moll. II, 74, pl. lxvii, c, f. 4.—W. G. BINNEY, Terr. Moll. IV, 35.—MORSE, Journ. Portl. Soc. I, 29, f. 75; pl. ix, f. 76 (1864); Amer. Nat. I, 607, f. 47 (1868).—TRYON, Am. Journ. Conch. II, 233, pl. ii, f. 11, 12 (1866).

Succinea wardiana, LEA, Proc. Am. Phil. Soc. 1841, II, 31; Trans. IX, 3; Obs. IV, 3 (1844).—PFEIFFER, Mon. Hel. Viv. II, 525.

Succinea vermeta, SAY, teste GOULD (see doubtful species, p. 271).—TRYON, Am. Journ. Conch. II, 233, pl. ii, f. 10 (1866).

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From Fort Simpson, on Mackenzie River, to the Gulf of Mexico; over all eastern North America.

A larger form is also found.

Fig. 469.

Jaw of *Succinea avara*.

Jaw strongly arcuate, ends curved and pointed; anterior surface smooth; concave margin simple, with a well-developed, acute median projection; convex margin waving.

Lingual membrane with 19—1—19 teeth, centrals tricuspid, laterals bicuspid, uncini serrated.

Fig. 470.

Lingual dentition of *Succinea avara*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8367	1	Betw. Lac des Mille Lac and Lake of the Woods.	R. Kennicott.	.....
8363	2	Apple Creek, lat. 47°.	.....	.....
8663	5	.....	W. G. Binney.	Cab. series.
8762	56?	Massachusetts.	W. Stimpson.	.....

Var. MAJOR.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8369	8	Mohawk, N. Y.	Dr. J. Lewis.	*S. vermeta*, Lewis, non Say.
8662	6	" "	"	Cab. ser. do.

Succinea stretchiana, BLAND.—Shell globose conic, thin, pellucid, shining, striatulate, greenish horn-colored; spire short, rather obtuse; suture deep; whirls three, convex, the last roundly inflated; columella arcuate, slightly thickened; receding; aperture oblique, roundly oval; peristome simple, with the margins joined by a thin callus. Length 6¼, diam. 5 mill.; aperture 5 mill. long.

Fig. 471.

Succinea stretchiana.

Succinea stretchiana, BLAND, Ann. N. Y. Lyc. VIII, 168, f. 16 (1865).—TRYON, Am. Journ. Conch. II, 231, pl. ii, f. 5 (1866).

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Little Valley, Washoe County, Nevada, on the eastern slope of the Sierra Nevada, 6500 feet above the sea.

The original description and figure are given above.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9361	1	Little Valley, Washoe [Co., Nevada.	.....	Type.

Succinea verrilli, BLAND.—Shell ovate-conic, thin, striate, subpellucid, orange-yellow colored; spire elevated, obtuse, with globose apex, of a reddish tinge; whirls three, very convex; suture deep; aperture oblique, roundly oval; columella arcuate, with a slight callus; peristome simple, the margins joined with a very thin callus. Length 7, diam. 3½ mill.; aperture 4 mill. long, 3 wide.

Fig. 472.

Succinea verrilli.

Succinea verrilli, BLAND, Ann. N. Y. Lyc. VIII, 169, f. 17 (1865).—TRYON, Am. Journ. Conch. II, 234, pl. ii, f. 15 (1866).

Salt Lake, Anticosti Island, Gulf of St. Lawrence.

The original description and figure are given above.

Buccal plate abruptly arched, with one prominent central projection.

Lingual formula about 80 rows (31—1—31). Plates notched at their outer posterior edges, longer than wide; central plate with three minute denticles, the middle one being largest; lateral plates bidentate, the outer denticle minute; uncini irregularly dentate or notched.

Animal (in alcohol) black.

Succinea aurea, LEA.—Shell very symmetrical in form, elongated oval, the texture very thin and lucid, and of a clear amber color; whirls three, the suture deeply impressed, and the whirls a little tabulated posteriorly; aperture narrow-ovate, acute posteriorly; the columella has an indistinct fold. Length 7½, breadth 3 mill.

Fig. 473.

Succinea aurea, enlarged.

Succinea aurea, LEA, Trans. Am. Phil. Soc. IX, 4; Obs. IV, 4 (1844); Proc. 1841, II, 32.—PFEIFFER, Mon. Hel. Viv. II, 325.—BINNEY, Terr. Moll. II, 76, pl. lxvii, c, f. 3.—W. G. BINNEY, Terr. Moll. IV, 37.—TRYON, Am. Journ. Conch. II, 241, pl. ii, f. 33 (1866).

Succinea ovalis, var., ANTHONY, Shells of Ohio (1843), No. 45, no descr.

Ohio.

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Succinea groenlandica, Beck.—Shell elongated, rather heavy, lightly wrinkled, of a light horn-color mixed with white; spire scalariform, bulbous; whirls four, the penultimate quite convex, the last equalling two-thirds the length of the shell; columella receding and narrowed, covered with a white callus; aperture oval; peristome simple, the right margin covered. Greatest length 8, breadth 5½ mill.; length of the aperture 5½, breadth 3½.

Fig. 474.

Succinea groenlandica.

Succinea groenlandica, Beck, Ind.—Pfeiffer, Mon. Hel. Viv. II, 529.—Möller, Ind. Moll. Gr. 4 (1842).—W. G. Binney, Terr. Moll. IV, 38, pl. lxxx, f. 4.—Tryon, Am. Journ. Conch. II, 234, pl. ii, f. 13 (1866).

Greenland.

Succinea obliqua, Say.—Shell ovate, pale green, yellowish-green, amber-colored, or cinereous, very thin and fragile, pellucid, sometimes roseate at apex; periostraca shining, minutely wrinkled or striated; whirls rather more than three, the last very large, and much expanded, and more or less oblique; spire very small, not prominent nor pointed; suture distinct, impressed; aperture oval, large and expanded, more or less oblique; columellar margin with a slight testaceous glazing; columella thin, sharp, narrowed; peristome thin, its edge blunted by the reflection of the periostraca. Greatest length 25, ordinary length 18 mill.

Fig. 475.

Succinea obliqua.

Succinea obliqua, Say, Long's Exped. II, 260, pl. xv, f. 7 (1824); Binney's ed. 32, pl. lxxiv, f. 7.—Adams, Shells of Vermont, 156, with fig. (1842).—DeKay, N. Y. Moll. 53, pl. iv, f. 53 (1843).—Pfeiffer, Mon. Hel. Viv. III, 15; in Chemnitz, ed. 2, 47, pl. v, f. 1, 2 (1854).—Binney, Terr. Moll. II, 69, pl. lxvii, b, f. 3, excl. syn. *tottenlana.*—W. G. Binney, Terr. Moll. IV, 35.—Leidy, T. M. U. S. I, 258, pl. xiii, f. 1–3 (1851), anat.—Tryon, Am. Journ. Conch. II, 232, pl. ii, f. 7 (1866).

Succinea ovalis, Say, Journ. Acad. Nat. Sci. Phila. I, 15 (1817); Nich. Encycl. 3d ed. (1819); Binney's ed. 8.—Adams, Shells of Vermont, 156 (1842).—Deshayes, in Encycl. Méth. II, 20 (1830); Fer. Hist. *l. c.* II, 139 (excl. syn. Gould); in Lam. ed. 2, VIII, 319.—Pfeiffer, Mon. Hel. Viv. II, 524; III, 15 (excl. syn. Gould); in Chemnitz, ed. 2, 48, pl. v, f. 3, 4.

Succinea lineata, DeKay, N. Y. Moll. 53, pl. iv, f. 51 (olim), 1843.

Succinea campestris of all American authors except Say.—Gould, Invert. 195, f. 126 (1841).—DeKay, N. Y. Moll. 54, pl. iv, f. 54 (1843).

Succinea greerii, Tryon, Am. Journ. Conch. II, 232, pl. ii, f. 8 (1866).

From Gaspé to Georgia, and from the Red River of the North.

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to Arkansas. It is also found fossil in the postpleiocene bluffs of the Mississippi River.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8381	6	Lake Winnipeg.	R. Kennicott.	.....
8382	3	Lake of the Woods.	"	.....
8383	1	Halifax, N. S.	.....	.....
8384	1	Betw. Lac des Mille Lac and Lake of the Woods.	R. Kennicott.	.....
8385	1	Milwaukee, Wisc.	I. A. Lapham.	.....
8386	20	Hiram, Ohio.	.....	.....
8387	10	Mohawk, N. Y.	Dr. J. Lewis.	.....
8656	4	.....	W. G. Binney.	Cab. series.
8825	10	Massachusetts.	W. Stimpson.	.....
9177	30+	Vermont.	J. E. Chittenden.	.....

Succinea totteniana, LEA.—Shell obliquely-ovate, of a greenish color, thin, shining, somewhat diaphanous, obsoletely striated; whirls three, convex, the last very large and globose; spire very short; suture impressed; aperture large, oval, oblique; peristome thin, acute. Greatest length 16 mill.

Fig. 476.

Succinea totteniana.

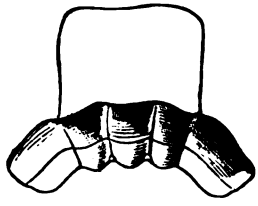
Succinea totteniana, LEA, Proc. Phil. Soc. II, 32 (1841); Trans. Am. Phil. Soc. IX, 4 (1844); Obs. IV, 4.—PFEIFFER, Mon. Hel. Viv. II, 52; III, 15.—GOULD, in Terr. Moll. II, 65, 72, pl. lxvii, b, f. 2.—W. G. BINNEY, Terr. Moll. IV, 35.—MORSE, Journ. Portl. Soc. I, 29, f. 73; pl. ix, f. 74 (1864); Amer. Nat. I, 606, f. 46 (1868).—TRYON, Am. Journ. Conch. II, 230, pl. ii, f. 1 (1866).

Succinea obliqua, teste BINNEY, *l. c.*

New England and New York.

Generally considered a variety of *S. obliqua*. It is a thinner and more fragile shell, proportionally more ventricose in form, with a shorter spire and larger aperture; it has a decided green color, almost unshaded with yellow, while in *S. obliqua* the amber yellow predominates.

Fig. 477.



Jaw of *Succinea totteniana*. [MORSE.]

Jaw arcuate, ends blunt; anterior surface with three heavy folds, modifying the concave and convex margins.

Lingual membrane with 100 rows of (33—1—33) long, slender teeth; centrals tricuspid, laterals bicuspid; uncini short, with three short teeth.

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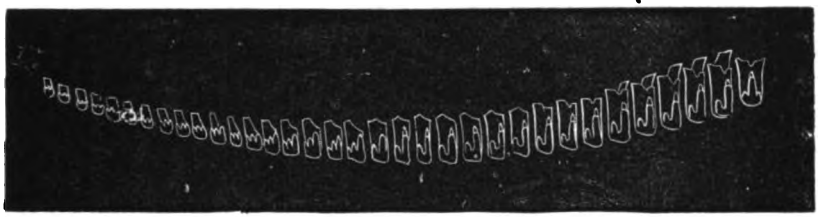
Fig. 478.



Lingual dentition of *Succinea totteniana*. [MORSE.]

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8388	3	New York.	Dr. J. Lewis.	.....
8655	5	.....	W. G. Binney.	Cab. series.

Succinea campestris, SAY.—Shell yellowish-white, or yellowish horn-color, rounded-ovate; periostraca shining, wrinkled; whirls three, not oblique, the last whirl large and ventricose, the other two constituting the spire, spire short, with acute apex; aperture ample, not much elongated, rounded anteriorly; peristome thin and sharp. Length 15, of aperture 10 mill.

Fig. 479.

Succinea campestris.

Succinea campestris, SAY, Journ. Acad. Nat. Sci. Philad. I, 281 (1817); Nich. Encycl. 3d ed. (1819); BINNEY's ed. 12.—FERUSSAC, Tabl. Syst. 31, pl. xi, f. 12.—PFEIFFER, Symbolæ, II, 56 (excl. syn. GOULD); Mon. Hel. Viv. II, 524 (excl. do.); III, 15 (excl. syn. DEKAY); in CHEMNITZ, ed. 2, 48, pl. v, f. 5, 6 (1854).—DESHAYES, in FER. II, 139.—BINNEY, Terr. Moll. II, 67, pl. lxvii, b, f. 1.—W. G. BINNEY, Terr. Moll. IV, 32.—TRYON, Am. Journ. Conch. II, 231, pl. ii, f. 4 (1866), not of DEKAY, 54, ADAMS, LINSLEY, ANTHONY, PRESCOTT (abs. descr.).

Succinea inflata, LEA, Trans. Am. Phil. Soc. IX, 5; Obs. IV, 5 (1844); Proc. II, 31 (1841).—PFEIFFER, Mon. Hel. Viv. II, 526; in CHEMNITZ, ed. 2, 49, pl. v, f. 9–11 (1854).—W. G. BINNEY, Terr. Moll. IV, 34, pl. lxxx, f. 11.—TRYON, Am. Journ. Conch. II, 230, pl. ii, f. 2 (1866).

Succinea unicolor, TRYON, Am. Journ. Conch. II, 230, pl. ii, f. 3 (1866).

It is a strictly southern species, observed as yet only in Florida and Georgia, and has been confounded with *S. obliqua*.

Fig. 480.

Lingual dentition of *Succinea campestris*.

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Lingual membrane with 50 rows of (30—1—30) teeth; centrals obtusely tricuspid; laterals bicuspid; uncini tridentate, the inner tooth much the largest.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8370	7	South Carolina.	Lieut. Kurtz.	.....
8661	6	St. Simon's Island, Ga.	J. Postell.	Cab. series.
8840	1	.....	Lieut. Kurtz.	.....

Succinea hawkinsii, BAIRD.—Shell elongate-obovate, thin, pellucid, shining, undulately striated, pinkish, within pearly; spire acute; whirls four, convex, the last equalling two-thirds the shell's length; suture impressed; aperture oval, effuse below. Length ¾, lat. ½ inch.

Fig. 481.

Succinea hawkinsii.

Hab. Lake Osoyoos, British Columbia. (*Brit. Mus.*)

This shell is of an elegant form, and of a pinkish color, with the interior of a pearly lustre. It is smooth and shining, but marked with waved striæ of lines of growth. It resembles very much in figure the *Succinea pfeifferi* of Europe, but is of a still more elegant shape, and of a brighter hue.

I have named it after Lieut. Col. Hawkins, R. E., Commissioner of the British North American Boundary Commission. (*Baird.*)

Succinea hawkinsii, BAIRD, Proc. Zool. Soc. 1863, 68.—BLAND, Ann. N. Y. Lyc. VIII, 168, f. 16 (1865).—TRYON, Am. Journ. Conch. II, 240, pl. ii, f. 31 (1866).

Fig. 481 is copied from a tracing of Baird's forthcoming plate, kindly furnished me by Mr. Carpenter.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9321	2	E. of Ft. Colville, W. T.	N. W. Bound. Surv.	.....

Succinea cingulata, FORBES.—Shell oblong-ovate, scarcely oblique, rather solid, striated, shining, tawny-amber colored, often with white spiral lines; spire drawn out, obtuse; whirls four, rather convex, the last equalling two-thirds the shell's length; aperture elongate-ovate, acute above, obliquely receding behind the axis at the base; columella arched. Length 12, breadth 6 mill.; of aperture 7 long, 3 broad at middle.

Fig. 482.

Succinea cingulata. [FORBES, *l. c.*]

Succinea cingulata, FORBES, Proc. Zool. Soc. 1850, 56, pl. ix, f. 8.—PFEIFFER, Mon. Hel. Viv. III, 17; IV, 815.—TRYON, Am. Journ. Conch. II, 241, pl. ii, f. 35 (1866).

Mazatlan.

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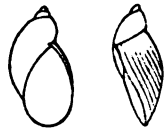
Succinea rusticana, GOULD.—Shell elongate, ovate conical, rather large, thin and fragile, pale greenish horn-color, surface rude and without lustre, coarsely and irregularly marked by the lines of growth; spire acute, of three or more moderately convex whirls, separated by a well-impressed suture, the last whirl large and long, narrowing towards the base; body portion of the face of the shell moderately large; aperture ovate, three-fourths the length of the shell; fold of the columella distinct. Length of axis 12½, breadth 6¼ mill.

Fig. 483.



Succinea rusticana.

Succinea rusticana, GOULD, Proc. Bost. Soc. Nat. Hist. II, 187 (Dec. 1846); Mollusca of Expl. Exped. 28, f. 29 (1852).—PFEIFFER, Mon. Hel. Viv. II, 523.—W. G. BINNEY, Terr. Moll. IV, 6, pl. lxxix, f. 14.—TRYON, Am. Journ. Conch. II, 263, pl. ii, f. 19 (1866).

Oregon to Tulare Valley, California.

For a figure of the animal, see page 256.

Cat. No.	No. of Sp.	Locality.	From whom received	Remarks.
8566	1	Osogo Creek, Cal.	Lt. R. S. Williamson.	.....

Succinea nuttalliana, LEA.—Shell lanceolate-ovate, thin and fragile, of a dull horn-color, somewhat rudely undulated by the lines of growth; composed of about three tumid whirls, forming a conical spire, the last whirl constituting nearly the whole shell; suture well marked; aperture nearly two-thirds the length of the shell, ovate, broadly rounded in front, the posterior angle being also somewhat rounded by the abrupt curvature of the peristome; columella very gently curved, the region being somewhat gibbous; no fold on the columella, but in the region of the spire it is slightly sinuous. Length 13, of aperture 10 mill.

Fig. 484.

Succinea nuttalliana.

Succinea nuttalliana, LEA, Proc. Am. Phil. Soc. II, 32 (1841); Trans. IX, 4; Obs. IV, 4 (1844).—PFEIFFER, Mon. Hel. Viv. II, 523.—BINNEY, Terr. Moll. II, 81, pl. lxvii, a, f. 4.—W. G. BINNEY, Terr. Moll. IV, 6.—TRYON, Am. Journ. Conch. II, 236, pl. ii, f. 26 (1866).

Oregon and California.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8330	1	Interior Oregon.	Com. Wilkes.	.....
8331	2	" "	"	.....
8334	1	" "	"	Cab. series.
9235	10	Wright's L., Cal.	Newberry.	Teste Lea.
9236	3	Rhett's L., Cal.	"	"

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Succinea oregonensis, LEA.—Shell elongated ovate, thin, of a somewhat saffron-yellow color, rather coarsely, though obtusely and distantly striated transversely; spire with two and a half or three well-rounded whirls, separated by a distinct suture, the last whirl seven-eighths the length of the shell; aperture two-thirds the length of the shell, strictly ovate, one-third longer than broad; columella arcuate, but not folded, a thin white callus of considerable extent covering it. Length 6½; greatest lateral diameter 3½, least 2½ mill.

Fig 485.

Succinea oregonensis, enlarged.

Succinea oregonensis, LEA, Proc. Am. Phil. Soc. II, 32 (1841); Trans. IX, 5; Obs. IV, 5 (1844).—PFEIFFER, Mon. Hel. Viv. II, 523.—BINNEY, Terr. Moll. II, 77, pl. lxvii, f. 2.—W. G. BINNEY, Terr. Moll. IV, 6.—TRYON, Am. Journ. Conch. II, 235, pl. ii, f. 18 (1866).

Succinea gabbii, TRYON, Am. Journ. Conch. II, 234, pl. ii, f. 14 (1866).

Oregon and California.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8714	2	San Francisco.	Rowell.	Cab. series.

SUBGENUS **BRACHYSPIRA,** Pfr.

Shell ovate, inflated; spire very short, acuminate; last whirl flattened, shield-shaped; aperture ample, angular.

Succinea salleana, PFEIFFER.—Shell depressed ovate, very thin, delicately striated, irregularly marked with impressed spiral lines, pellucid, shining, whitish horn-colored; spire very short, subtuberculous; whirls two and a half, the penultimate convex, the last exceeding three-fourths the length of the shell; columella with a slight callus, strictly receding; aperture subparallel to the axis, angularly oval; peristome subthickened, its right end scarcely arched. Length 19, diam. 10, height 17 mill; length of aperture 16 mill., breadth below middle 9 mill.

Fig. 486.

Succinea salleana.

Succinea salleana, PFEIFFER, Proc. Zool. Soc. Nov. 1849, 133; Mon. Hel. Viv. III, 16; in CHEMNITZ, ed. 2, 49, pl. v, f. 7, 8.—W. G. BINNEY, Terr. Moll. IV, 42, pl. lxxix, f. 18.—TRYON, Am. Journ. Conch. II, 240, pl. ii, f. 32 (1866).

Near New Orleans.

Succinea effusa, SHUTTLEWORTH.—Shell depressed-oval, very thin, transparent and shining, lightly striated, grayish horn-colored; spire

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remarkably short, acute; whirls two and a half, the last one very much the largest, depressed, equalling five-sixths the length of the shell; columella scarcely rounded and hardly receding; aperture very large, oblique and oval; peristome simple, regularly rounding. Length 12, diam. 7 mill.; length of the aperture 10, breadth 6 mill.

Fig. 487.

Succinea effusa.

Succinea effusa, Shuttleworth, MSS.—Pfeiffer, Mon. Hel. Viv. III, 17; in Chemnitz, ed. 2, 42, pl. iv, f. 18–20 (1854).—W. G. Binney, Terr. Moll. IV, 41, pl. lxxx, f. 12.—Tryon, Am. Journ. Conch. II, 231, pl. ii, f. 6 (1866).

East Florida.

Doubtful and Spurious Species of Succinea.

Succinea putris, Lin. (Deshayes, Encycl. Méth. 21; DeKay, 1839, 31; Férussac, Tabl. Syst. 9), and

Succinea amphibia, Drap. (Forbes, Brit. Ass. 1837, 144; Férussac, Tabl. Syst.; Binney, Terr. Moll. II, 159; Mrs. Sheppard, Tr. Lit. Hist. Soc. Quebec, 1829, I, 194), have been quoted from America. Having never seen a well-authenticated specimen of either, I omit them.

Succinea vermeta, Say, New Harm. Diss. II, 230 (1829); Desc. 23 (1840); ed. Binney, 38 (*S. venusta*, W. G. B., err. typ.). Gould quotes this in the synonymy of *S. avara*. See Terr. Moll. II, 64, 73.

Succinea aperta, Lea, Trans. Am. Phil. Soc. VI, 101, pl. xxiii, f. 101; Obs. II, 107 (1839), is said by Gould (Terr. Moll. II, 67) to be identical with *S. rotundata* of Sandwich Islands.

Fig. 488.

Succinea pellucida.

Succinea pellucida, Lea (Proc. Acad. Nat. Sci. Philad. 1864, 109; Journ. of same; Obs. XI, 134, pl. xxiv, f. 106), appears to me to be *Limnæa columella*. A figure of an authentic specimen, received from Mr. Lea, is here given.

Spurious Species of Helicidæ.

Bulimus (Partula) bataviæ, var. *β. minor*. United States, Gratelour (Soc. Lin. de Bord. XI, 165).

Partula otaheitana, Fer. United States (Gratelour, *l. c.* p. 426).

Agatina fuscata, Rafinesque, is probably not found in the United States. (See Terr. Moll. I, 50.)

To the Terrestrial Mollusks, I, p. 348 *et seq.*, and IV, p. 152,[1] I refer for information regarding the following species of Rafinesque:

Zolotrema, Raf. — *Menomphis*, Raf.

Hemiloma ovata, Raf. — *Aplodon nodosum*, Raf.

[1] See also Binney's and Tryon's ed. of Rafinesque's Complete Writings.

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Chimotrema planiuscula, RAF.
Hemiloma avara, RAF.
Mesodon maculata, RAF.
Mesomphix, RAF.
Odomphium, RAF.
Odotropis, RAF.
Omphalina, RAF.
Omphalina cuprea, RAF.
Stenostoma convexa, RAF.
Stenotrema convexa, RAF.
Toxostoma globularis, RAF.
Toxotrema globularis, RAF.
Toxotrema complanata, RAF.
Triodopsis lunula, RAF.
Trophodon, RAF.
Xolotrema lunula, RAF.
Xolotrema triodopsis, RAF.

Oxyurus quadrilus, RAF., is a typographical error of my own in my "Notes," No. 4. No such name was proposed by him.

FAMILY ARIONIDÆ.

Lingual membrane with numerous similar, transverse rows of teeth.

Jaw smooth with a central projection, or ribbed and having no central projection.

Body elongate, attached its whole length to the upper surface of the foot, or more or less spiral and prominent on the middle of the upper surface of the foot. Eyes at the end of long, cylindrical, retractile peduncles; tentacles shorter, retractile. Mantle thin, small, discal or spiral, on the middle of the back; respiratory orifice subcentral, on the right side. Foot narrow, elongate, usually with a distinct locomotive disk, with a posterior, distinct gland. Vent near the respiratory orifice. Orifice of reproductive organs usually behind the right peduncle, or below the respiratory orifice.

Shell thin, shining; peritreme acute, simple or sometimes internal and rudimentary.

This family contains numerous genera and species found in every quarter of the globe. In North America it is represented by only two genera, *Arion* and *Zonites*. Their habits are respectively the same as those of *Limax* and *Hyalina*.

The shell exists in various stages of development in the *Arionidæ*, in some containing a portion of the animal in spiral, in others being internal, and the body attached to the foot in its whole length. This and the characteristics of the mucous pore have suggested the two subfamilies *Arioninæ* and *Zonitinæ*.

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Subfamily ARIONINÆ.

Body elongate, attached its whole length to the upper surface of the foot. Mantle shield-like, simple, entirely inclosing a flat, oblong, not spiral shell. Subcaudal gland lunate, transverse, horizontal.

This subfamily corresponds with the family *Arionidæ* of H. & A. Adams. There are but two genera at present known, *Arion* and *Geomalacus*. The latter has been found only in Ireland. It differs from *Arion* in having a distinct internal shelly plate, and in the position of the orifice of the reproductive organs being below the right eye-peduncle.

ARION, Ferussac.

Posterior termination of body obtuse. Integuments crowded with elongated tuberosities on the back, and on the sides with elongated tubercular plates having furrows between. Mantle anterior, oval, small, covered with granulations, free at the front and on the sides, attached posteriorly, containing in its posterior

Fig. 489.

Arion fuscus.

part numerous fine calcareous sandy grains. Locomotive disk not expanded at the margin, when the animal is fully extended very narrow, having in some species a narrow median band, and in others not. Respiratory orifice at the anterior margin of the mantle, small. Anal orifice contiguous to the former. Orifice of organs of generation under the two last. On the upper part of the posterior extremity of the body is a triangular pore or sinus, with the point directed forwards, a process or projection of the integument serving as a cover to the sinus.

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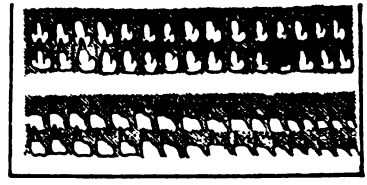
Jaw with broad, crowded, anterior ribs and marginal denticulations.

Fig. 490.

Jaw of *Arion fuscus*. [Moq.-Tand.]

The lingual ribbon is broad, composed of a median row of tricuspid denticles, the central toothlet of each being long and acutely pointed, the side toothlets short and blunt. The lateral teeth are modifications of the central, 31 in number, but bicuspid, the inside toothlet of the central being omitted in

Fig. 491.



Lingual dentition of *Arion fuscus*.

the laterals on the side nearest the central line, and the teeth gradually changing as they pass off laterally.

The genus *Arion* was separated from *Limax* by M. Ferussac, to contain those species of the latter genus having a terminal pore or sinus. It is universally recognized, and has been fortunate in escaping any confusion of synonymy.

The habits of the North American species have been given under *Limacidæ*.

The internal calcareous grains which represent the shell are in some species isolated, in others aggregated into a nearer resemblance to the internal plate of *Limax*. On this distinction are based the subgenera *Lochea* and *Prolepis*.

Subgenus **PROLEPIS**, Moq.-Tand.

Shield covering an imperfect, rugose, shell-like plate, formed by the aggregation of a certain number of calcareous granulations.

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Arion fuscus, Müller.—Color whitish or light ashy, sometimes with a tinge of brown, or dark grayish; an obscure, ill-defined dark colored line or band rises where the mantle meets the base of the tentacles on both sides, and extending along the whole length of the mantle to its posterior extremity converges towards the line of the opposite side; another band proceeding from under the posterior edge of the mantle, not quite continuous with the above described line, runs along the sides of the body to its extremity. Body cylindrical, narrow, when extended very much elongated, expanding a little towards its extremity, and ending in a flat and rounded termination; its upper surface is covered with narrow, oblong, prominent glands, appearing sometimes as if carinated, and

Fig. 492.

Arion fuscus.

arranged in parallel rows, the flanks with elongated tuberculated plates and finer granulations. Head darker than the body, projecting very little beyond the mantle. Eye-peduncles blackish, one-eighth the length of the body, stout, bulbs translucent, ocular spot at the superior part, black. Tentacles immediately under the eye-peduncles, very short, conical. Mantle small, oval, narrow, commencing just behind the insertion of the eye-peduncles, less than one-third of the length of the animal; covered with granulations tending to a vermiform shape. Disk of the foot whitish, without a separate locomotive band, the marginal boundary between it and the body marked by a furrow, projecting beyond the body posteriorly. Respiratory foramen small, with a cleft to the margin of the mantle. Between the eye-peduncles is a tubercular ridge with furrows on each side. The triangular mucus pore is on the upper surface of the posterior extremity, is very apparent, and has a process of the skin which seems to cover it, and sometimes to project above it. When fully grown, the extreme length is more than 50, its usual length about 25 mill. Internal granulations coarsely united or aggregated into a somewhat ovular, semitransparent, very granular plate.

Limax fuscus, Müller, Hist. Verm. II, 11 (1774).

Arion hortensis, Férussac, Hist. 65, pl. ii, f. 4, 6; Suppl. p. 96 a (1819).—Binney, Bost. Journ. Nat. Hist. IV, 170 (1842); Terr. Moll. II, 27, pl. lxiv, f. 1; lxv, f. 2 (1851).—Leidy, T. M. U. S. I, 249, pl. ii, f. 1–4 (1851), anat.—DeKay, N. Y. Moll. 23 (1843).—Reeve, Brit. L. and F.-W. Moll. 11, fig.

Arion fuscus, Moquin-Tandon (which see for further foreign synonyms).

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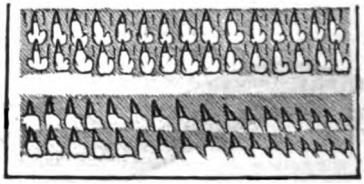
The jaw is described by Moquin-Tandon as moderately arched, of a light tawny color, brownish near the concave margin; extremities a little attenuated; anterior ribs about twelve, well marked, especially when the jaw is dry, flattened, marginal crenulations perfectly distinct, very obtuse.

Fig. 493.

Jaw of *Arion fuscus*.

Lingual membrane broad, teeth 31—1—31; central teeth tricuspid, laterals bicuspid, uncini with a single cusp.

Fig. 494.



Lingual dentition of *Arion fuscus*.

Found near Boston. It is an introduced species common over the whole of Europe.

When the animal is fully extended, the mantle occupies less than a fourth part of its whole length, and the dark lines on the mantle and back are continuous with each other. The head only projects from the mantle, the neck not being visible. Its surface is constantly covered with a watery mucus, and it suspends itself with a thread of mucus like the other species. The mucous secretion from the terminal pore is transparent and very viscid. It is not distinguished by any considerable variety of color or markings. It occurs in small numbers in the vicinity of Boston, under stones, at road-sides, in company with *Limax agrestis*, and more plentifully in gardens within the city. In the remarks on this species, formerly published by Dr. Binney, he hesitated in considering it to be identical with the foreign species of the same name. Having later found it somewhat numerous in a locality in Boston, he procured specimens agreeing very well with foreign descriptions and figures, especially with that variety described by M. Ferussac as "griseus, unicolor, fasciis nigris," and had no longer any doubt on the subject. The specimens found in gardens are, however, much larger than the size indicated by the descriptions. It is called a small species by both

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M. Ferussac and M. Lamarck, and so it is, as it exists in the country; but in the city it is sometimes two inches in length, when not fully extended, and of a corresponding bulk. The dark lines are most strongly marked in the large variety. The small variety is more delicate in its markings, and has a tinge of yellow on the foot. It is still restricted in its distribution, so far as known, to the neighborhood of Boston alone.

Subgenus **LOCHEA**, Moq.-Tand.

Shield covering small, isolated, unequal, calcareous granulations

Arion foliolatus, Gould.—Color a reddish-fawn, coarsely and obliquely reticulated with slate-colored lines forming areolæ, which are indented at the sides, when viewed by a magnifier, so as to resemble leaflets; the cuirass is concentrically mottled with slate-color, and the projecting border of the foot is also obliquely lineated. The body is rather

Fig. 495.

Arion foliolatus.

depressed, nearly uniform throughout, and somewhat truncated at the tip, exhibiting a conspicuous pit, which was probably occupied by a mucus gland. The shield is very long, smooth, and has the respiratory orifice very small, situated a little in front of the middle. The eye-peduncles are small and short. Length 85 mill.

Arion foliolatus, Gould, Moll. U. S. Expl. Exped. 2, f. 2, a, b (1852).—Binney, Terr. Moll. II, 30; pl. lxvi, f. 3 (1851).—W. G. Binney, Terr. Moll. IV, 6.

Jaw —?

Lingual membrane —?

Found at Discovery Harbor, Puget Sound.[1]

[1] It is erroneously quoted from Boston, by Grateloup, Distr. Geog. des Limaciens, p. 8.

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The position of the orifice of respiration on the anterior portion of the shield, and the presence of the mucus pore at once indicate the generic position of this species. I have had no opportunity of examining the jaw or the rudimentary granules.

It is readily distinguished by the leaf-like areolæ which mark the surface, and suggest the specific name.

Spurious Species of Arion.

Arion (*Lochea*) *empiricorum* is quoted without authority or description from the Western States by Gratelour (Distr. Geogr. de la Famille des Limaciens).

ARIOLIMAX, Mörch.

Body attenuated towards the posterior extremity, which is carinated strongly. Surface with oblong tuberosities. Mantle anterior, bluntly truncated before and behind, minutely granulated, free at the front and sides, attached posteriorly, containing

Fig. 496.

Ariolimax columbianus, one-half natural size.

a testaceous rudiment. Longitudinal furrows along the sides above the foot. Locomotive disk —? Respiratory orifice at the posterior third of the shell. Anal orifice —? Orifice of the generative organs —? A caudal mucus pore.

Testaceous rudiment hexagonal, longer than wide, ends pointed acutely, not spiral.

Fig. 497.

Jaw of *Ariolimax columbianus*.

Jaw arcuate, with numerous crowded anterior ribs, denticulating the concave margin.

Lingual membrane (of *A. columbianus*) very broad and long, composed of about 120 rows of teeth, each row containing 113 teeth (56—1—56);

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central teeth large, with a long median cusp, side cusp obsolete; lateral teeth and uncini bicuspid, the inner cusp longer and more

Fig. 498.

Lingual membrane of *Ariolimax columbianus*.

slender than the outer, and becoming proportionally still more slender and lengthened as the teeth are modified in passing off laterally.

This genus is founded on the large species inhabiting the Pacific States, known as *Limax columbianus*. It is readily distinguished from *Arion* by its internal shelly plate, and the position of the respiratory orifice; from *Limax* by its dentate jaw. The only species of *Geomalacus* yet known has an internal plate, but its respiratory orifice is much more anterior.

Ariolimax columbianus, Gould.—Color a dark, dirty, greenish-yellow, either uniform or in some varieties clouded with large purplish-black, irregular blotches. The body is large and corpulent, the anterior portion elevated, with the back rounded, and the posterior portion strongly carinated; at the posterior tip there is apparently a mucus pore. The margin of the foot extends beyond the mantle and forms a ruffle around

Fig. 499.

Ariolimax columbianus, reduced one-half.

the animal, with transversely oblique markings. The surface is tessellated with coarse elongated papillæ arranged longitudinally. The cuirass is broad, truncated in front, minutely granulated, with the respiratory orifice at the posterior third. Face vertically wrinkled; eye-peduncles rather short, thickened at base, colored like the body and finely granulated; tentacles long and slender. Length 5½ inches.

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Limax columbianus, Gould, in Terr. Moll. II, 43, pl. lxvi, f. 1 (1851); U. S. Expl. Exped. Moll. 3, f. 1, a, b (1852).

Ariolimax columbianus, Mörch, Mal. Blatt. VI, 110.—W. G. Binney, Am. Journ. Conch. I, 48, pl. vi, f. 11–13.

Internal shell longer than broad, hexagonal, ends pointed.

Fig. 500.

Jaw of *Ariolimax columbianus*.

Jaw narrow, arcuate, dark horn or reddish; anterior surface with more than fifteen coarse, crowded ribs, denticulating the concave margin.

Lingual membrane very broad, teeth 57—1—57; centrals tricuspid; laterals and uncini bicuspid.

Fig. 501.

Lingual membrane of *Ariolimax columbianus*.

Specimens referred to this species have been found in Washington Territory, Oregon, and California (Strs. of Fuca to Santa Barbara, *Cooper*).

In form, marking, and coloring it may be compared to *Arion empiricorum* of Europe.

Dr. Cooper remarks:—

"This large slug abounds in the dense damp forests near the Pacific coast, and was not observed by me in the dry region east of the Cascade Mountains. It is to be found every month of the year in Washington Territory, being even more abundant in the rainy winter than in warmer seasons; its activity being checked only by extreme cold, while it cannot bear continued drought. It not unfrequently drops from the trees, &c. This slug grows to the length of six inches, but shrinks to a third of that size in alcohol. Its surface is smooth, not rugose, when alive, as represented in Dr. Binney's plate, and its color is a pale yellowish-olive, usually more or less blotched with black." (Pac. R. R Rep. p. 377.)

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Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8450	2	.....	Lt. W. P. Trowbridge.	.....
4283	1	San Francisco, Cal.	"	.....
4211	1	Oregon City.	Lt. R. S. Williamson.	.....
4233	4	Puget Sound.	.....	.....
4291	7	" "	Com. Wilkes.	.....
8452	1	" "	"	.....
4226	2	Port Oxford, Cal.	Lt. W. P. Trowbridge.	.....
4227	2	.....	"	.....
8543	1	W. Coast.	.....	Cab. ser.es.
4212	1	Cape Flattery, W. T.	Lt R. S. Williamson.	.....

Subfamily ZONITINÆ.

Body more or less spiral, prominent from the middle of the upper part of the foot, and covered with a more or less developed spiral shell, sometimes hidden by the reflexed edge of the mantle. Subcaudal gland linear, perpendicular.

The *Zonitinæ* correspond to the *Stenopidæ* of H. & A. Adams. There are numerous genera found in every quarter of the globe, but represented in North America by *Zonites* alone.

ZONITES, Montf.

Shell broadly umbilicated, orbiculate, convex or discoidal, striated or decussated, beneath smooth and shining; whirls 6 or 7, gradually increasing in size; aperture oblique and lunate; peristome straight, acute, and slightly thickened internally.

Fig. 502.

Jaw of *Zonites fuliginosa.*

Animal with a caudal mucus pore.

Jaw arcuate, large, simple, concave margin with a strong median projection.

Lingual membrane broad, teeth long and slender, centrals tricuspid, laterals bicuspid, uncini aculeate, curved. The central

Fig. 503.

Lingual dentition of *Zonites fuliginosa.*

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and lateral teeth are arranged in straight, transverse rows, the uncini in somewhat diagonal rows, thus dividing the lingual membrane into three distinct transverse sections.

The species of this genus are allied to the *Hyalinæ* by the character of the shell, jaw, and lingual dentition, but differ from them in the presence of the caudal mucus pore.

Subgenus ÆGOPIS, Fitz.

Shell widely umbilicated, orbicularly convex or depressed, striated or decussated, smooth below, shining; whirls 6–7, gradually increasing; aperture oblique, lunar; peristome straight, acute, lightly labiate within.

Zonites newberryana, W. G. Binn.—Shell broadly umbilicated, orbicularly depressed, solid, lightly decussated by incremental striæ, and numerous fine spiral lines; color black or reddish-brown, under the epidermis white and shining; suture deeply impressed; spire depressed; whirls six, regularly increasing, the upper ones flattened, the last convex, rounded below, and slightly deflected at the aperture; umbilicus broad, showing all the volutions clearly; aperture oblique, transversely-lunar; in young specimens the decussated sculpturing of the shell on the parietal wall of the aperture is covered with a light callus as the animal grows, and elegantly marked with numerous fine, crowded, spiral lines; in mature specimens this beautiful marking is entirely obliterated by the deposition of callus, but on breaking the shell, the lines will be found to exist within; peristome simple, acute, thickened within, ends slightly approximated, joined by a white callus. Greater diam. 37, lesser 20; height 13 mill.

Fig. 504.

Zonites newberryana.

Helix newberryana, W. G. Binney, Proc. Acad. Nat. Sci. Phila. 1858, 115; Terr. Moll. IV, 20, pl. lxxvi, f. 7.—Pfeiffer, Mal. Blatt. 1859, 7.

Macrocyclis newberryana, Tryon, Am. Journ. Conch. II, 244, pl. iii, f. 5 (1866).

San Diego, California, and lately catalogued by Dr. Newcomb from the Temescal Mountains, near Los Angelos.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8361	5	San Diego, Cal.	Lieut. Ives.	Cab. series.

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Zonites cultellata, THOMSON.—Shell orbicular, depressed, carinated, shining, reddish horn-color, with a broad revolving band of white at the periphery and sutures; whirls six and a half, rather convex, decussated by minute lines of growth and microscopic revolving lines; below, these lines are obsolete, the surface is shining, whitish, with a broad reddish horn-colored band below the carina; suture impressed; aperture oblique, lunate; peristome acute, not thickened and scarcely reflected at the umbilicus, which is broadly expanded, and shows all the volutions to the apex. Greater diam. 35, lesser 19; height 13 mill.

Fig. 505.

Zonites cultellata.

Helix cultellata, THOMSON, MS., W. G. BINNEY, Terr. Moll. IV, 22, pl. lxxvi, f. 6; Proc. Acad. Nat Sci. Philad. 1857, 185.—PFEIFFER, Mon. Hel. Viv. IV, 347.

The shell from which the description and figure were drawn was sent me by Mr. J. H. Thomson from Contra Costa County, California. The fact of no other specimens having been found, and the strong resemblance of the shell to species of the European group of *Z. albanica* and *acies*, have thrown doubt upon its being really an inhabitant of California.

SUBGENUS **OMPHALINA,** Raf.

Shell umbilicated or perforate, depressed orbicular, striated above, shining and smooth below, sometimes uniformly smooth; last whirl dilated, not descending; aperture broad, ovate; peristome simple, straight, margins converging.

Fig. 506.

Animal of *Zonites fuliginosa.*

Animal (of *Z. fuliginosa*) nearly twice as long as the diameter of the shell, blackish, or bluish-black, darkest on the head, neck, and eye-peduncles. Eye-peduncles short in proportion to the length of the animal, and set widely apart. Respiratory foramen in the angle formed by the junction of the peristome with the body-whirl. Base of foot whitish, the locomotive band defined by two very fine lines, or furrows. A double, marginal furrow runs along the sides of the foot, from the head nearly to the posterior extremity,

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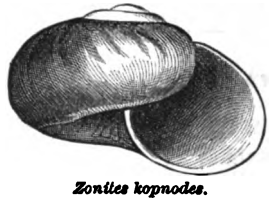
where it passes upward, and joins that from the opposite side, leaving posteriorly a flattened, rounded extremity, somewhat prominent and glandular. Upon the centre of the extremity is a longitudinal fissure, or sinus, which is sometimes expanded, and at other times closed and invisible. Secretion of mucus from the extremity profuse.

I have adopted Rafinesque's name *Omphalina*[1] for this subgenus, because the presence of the mucus pore requires a distinction between the following species and those of *Mesomphix*, to which they are usually referred. Where the pore is not considered a generic distinction the species here grouped will be considered as belonging to *Mesomphix*, a subgenus of *Hyalina*.

Zonites kopnodes, W. G. Binn. — Shell depressed globose, wrinkled, below smooth; spire short, depressed; suture moderate; whirls five, rapidly increasing, the last very ventricose and large, sometimes marked with coarse revolving lines; aperture large, round, peristome simple, acute, ends approached, joined by a slight deposition of brownish callus over the parietal wall, reflected at the small and deep umbilicus. Greater diam. 35, lesser 28; height 13 mill.

Fig. 507.



Zonites kopnodes.

Helix kopnodes, W. G. Binney, Proc. Acad. Nat. Sci. Philad. 1857, 186; Terr. Moll. IV, 104, pl. lxxx, f. 14.—Pfeiffer, Mon. Hel. Viv. IV, 346.

Hyalina kopnodes, Tryon, Am. Journ. Conch. II, 248, pl. iv, f. 21 (1866).

Found in Georgia, Alabama, and Tennessee in the Cumberland Mountains.

A variety from Columbus, Georgia, and Franklin County, Tennessee, is more depressed, and has longitudinal striæ on the upper surface like *Z. lævigata* (Fig. 508).

Fig. 508.

Zonites kopnodes, var.

Fig. 509.

Lingual dentition of *Zonites kopnodes.*

The lingual membrane is very broad,

[1] See p. 67 of ed. Binney and Tryon.

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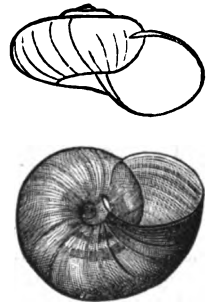
has 70 rows of ninety-three long, slender teeth (46—1—46). Centrals tricuspid, laterals bicuspid, uncini aculeate and curved.

Animal dirty white, the granules sometimes marked by a darker color, running into a light fawn color on the top of back near the head; eye-peduncles and tentacles darker; upper part of tail is also a slight slate-color, darker below the furrows. The breadth of the animal is very much greater than in most of our species, the head broader, blunter, the eye-peduncles shorter, heavier, and very much more widely set apart. A narrow locomotive disk below. Along the side of the foot, parallel to the base, are two furrows, rather darker in color, running upwards towards the tail, and meeting on its upper surface, above a mucus pore. The extremity of the tail broad and flattened, spade-like, usually curved at its point when the animal is in motion. The animal is more sluggish and less sensitive to touch than the other species. Its labial tentacles are highly developed, being nearly as long as the lower feelers. Measurements of an individual in motion: Extreme length of foot 59, before shell 16, behind shell 14, of shell on back 32, of tentacles 10; breadth of head 11 mill.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8676	2	Alabama.	W. G. Binney.	Cab. series.

Zonites fuliginosa, Griff.—Shell thin, depressed on the upper surface, epidermis dark, approaching to chestnut-color, shining and smooth, wrinkled; whirls four and a half, rapidly increasing, with irregular, oblique wrinkles, the last whirl very voluminous, and expanding transversely towards the aperture; suture very little impressed; aperture very oblique, ample, lunate-ovate, within pearly or iridescent; peristome simple, thin, brittle, with a light, testaceous deposit within, the two terminations approaching each other very nearly, that of the columella somewhat reflected; umbilicus deep, not much expanded. Greater diam. 26, lesser 22; height 13 mill.

Fig. 510.



Zonites fuliginosa.

Helix fuliginosa, Griffith, in letters; Binney, Terr. Moll. II, 222, pl. xxxi; Bost. Journ. Nat. Hist. III, 417, pl. xxiv, excl. syn. (1840).—Leidy, T. M. U. S. I, pl. ix, f. 4 (anat.).—Adams, Shells of Vermont, 161, excl. syn. (1842).—DeKay, N. Y. Moll. 37, pl. iii, f. 22 (1843).—Pfeiffer, Mon. Hel. Viv. I, 88: in Chemnitz, ed. 2, II, 104, pl. lxxxiv, f. 1-3.—Reeve, Con. Icon. 675 (1852).—W. G. Binney, Terr. Moll. IV, 105.—Morse, Amer. Nat. I, 315, f. 23, 24 (1867).

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Helix capillacea, PFEIFFER, Symbolæ, II, 24, not FER., teste PFR.
Omphalina cuprea, RAFINESQUE, Enum. and Acc. 3; ed. BINNEY and TRYON, p. 67.
Hyalina fuliginosa, TRYON, Am. Journ Conch. II, 248, pl. iii, f. 16 (1866).

Has been found in nearly all the Northern, Western, Middle, and some of the Southern States. In one case I have known of its being found at the northern side of Lake Superior. Also in Canada.

Fig. 511.

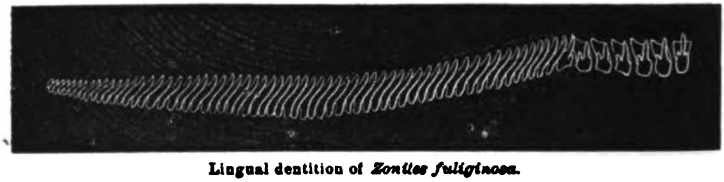
Jaw of *Zonites fuliginosa*.

Animal (see p. 283).

Jaw very arcuate, of almost uniform breadth, ends blunt; anterior surface with transverse striæ; concave margin simple, with a well-developed, blunt, median projection.

Lingual membrane very broad, composed of 87 rows (64—1—64) of one hundred and twenty-nine long slender teeth each; centrals

Fig. 512.



Lingual dentition of *Zonites fuliginosa*.

tricuspid, laterals 10, bicuspid, in a straight transverse row; uncini curved, aculeate, in a somewhat diagonal row.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7929	1	Marietta, Ohio.	W. Holden.	.....
8596	2	.....	W. G Binney.	Cab. series.
8749	3	Pennsylvania.	W. Stimpson.	.....

Zonites caduca, PFR. — Shell umbilicated, depressed, fragile, shortly striate, white with a reddish horn-colored epidermis; spire slightly elevated, apex delicate; whirls five and a half, rather convex, the last much broader, rather flattened below, excavated around the tunnel-like, minutely closed umbilicus; aperture large, obliquely oval; peristome simple, thin, with ends approaching, joined with a very light callus, the columellar one scarcely broadened. Greater diam. 27, lesser 22; height 14 mill.

Fig. 513.

Zonites caduca.

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Helix caduca, PFEIFFER, Mon. Hel. Viv. I, 89, &c.—REEVE, Con. Icon. 530. —W. G. BINNEY, Terr. Moll. IV, 105.

Hyalina caduca, TRYON, Am. Journ. Conch. II, 248, pl. iii, f. 15 (1866).

Admitted in the catalogue on the authority of Pfeiffer (Roëmer's Texas, 455), who quotes it from New Washington. It is a Mexican shell: a specimen from that locality is figured (Fig. 513).

Zonites friabilis, W. G. BINN.—Shell very globose, transparent, brittle, thin, sometimes thick, shining, reddish; spire very short, conic; whirls five, convex, lightly wrinkled, rapidly increasing, the last very large and ventricose; suture moderate; aperture circular, equally high and broad, within bluish and slightly thickened by a very thin white callus; peristome simple, sharp, thin, at its junction with the body-whirl violet-colored and reflected, so as to cover a portion of the small and deep umbilicus; the parietal wall of the aperture is covered with a light violet-colored callus. Greater diam. 26, lesser 20; height 13 mill.

Fig. 514.

Zonites friabilis.

Helix friabilis, W. G. BINNEY, Proc. Acad. Nat. Sci. Phila. 1857, 187; Terr. Moll. IV, 106, pl. lxxx, f. 2.—PFEIFFER, Mon. Hel. Viv. IV, 346.—BLAND, Ann. N. Y. Lyc. VII, 126.

Helix lucubrata, PFEIFFER, Mon. Hel. Viv. IV, 68; Mal. Blatt. 1858, 32, not of SAY.[1]

Hyalina friabilis, TRYON, Am. Journ. Conch. II, 247, pl. iii, f. 12 (1866).

Indiana, Illinois, Alabama, Arkansas, Texas. The specimens from the first two States only deserve the specific name, the other localities furnishing quite thick shells.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8033	5	Texas.	Lieut. Couch.	.....
8627	3	"	"	Cab series.
5810	6	"	W. G. Binney.	.....
8939		Hot Springs, Ark.	Dr. B. Powell.	.....

Zonites lævigata, PFEIFFER.—Shell somewhat convex, oftener depressed; epidermis greenish horn-color, shining, thin; whirls five, rather flattened, rapidly enlarging, with beautiful and regular oblique striæ and revolving microscopic lines; the last whirl expanding towards the aperture, not descending; aperture transverse, broadly lunar, ample,

[1] *H. lucubrata*, Say, is not included in my work, being found beyond the geographical limits embraced.

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with a testaceous deposit within; peristome thin, acute, straight, extremities approaching, its lower extremity inserted into the centre of the base, and somewhat reflected; base smooth, perforate. Greater diam. 18, lesser 15; height 9 mill.

Fig. 515.

Zonites lævigata.

Helix lævigata, PFEIFFER, Mon. Hel. Viv. I, 64; III, 67 (excl. syn.); in CHEMNITZ, ed. 2, II, 106, pl. lxxxiv, f. 17–19 (excl. syn.).—REEVE, Con. Icon. no. 672 (1852)?—DESHAYES in FER. I, 94, pl. lxxxii, f. 6.—W. G. BINNEY, Terr. Moll. IV, 106.—BLAND, Ann. N. Y. Lyc. VII, 119 (excl. syn. *inornata*).

Helix lucubrata, BINNEY, nec SAY, Terr. Moll. II, 225, pl. xxxii.

Helix fuliginosa, BINNEY, in Bost. Journ. (pars, excl. descr., syn., et fig.), 1840.

Helix inornata, REEVE, *l. c.* 666, not SAY.

Hyalina lævigata, TRYON, Am. Journ. Conch. II, 247, pl. iii, f. 12 (1866).

From Pennsylvania to Florida; from Arkansas to Illinois.

Fig. 516.

Zonites lævigata, var.

The shell described and figured above is well known in collections, and can be confounded with no other now known. It has, however, been peculiarly unfortunate in its synonymy, as a reference to the fourth volume of the Terrestrial Mollusks and the seventh volume of the New York Lyceum Annals will show.

A more globose variety is figured.

Cat. No.	No. of Sp	Locality.	From whom received.	Remarks.
8038	1	.....	.....	.....
8631	1	Georgia.	W. G. Binney.	Cab. series.
8866	1	Columbus, Ga.	"	.....

Zonites subplana, BINNEY.—Shell flattened, planulate above and beneath; epidermis brownish or smoky horn-color, shining; whirls five and a half, those nearest the apex striated transversely with very minute and delicate wrinkles; suture distinct, not much impressed; aperture transverse, not expanded, the plane of the aperture making nearly a right angle with the plane of the base of the shell; peristome simple, thin, acute; base flattened, umbilical region a little impressed; umbilicus small, round, and deep, not exhibiting the volutions. Greater diam. 20, lesser 16; height 6 mill.

Fig. 517.

Zonites subplana.

Helix subplana, BINNEY, Bost. Journ. Nat. Hist. IV, part 1, cover, p. 3 (1842); IV, 241 (1842); Terr.

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Moll. II, 229, pl. xxxii.—Pfeiffer, Mon. Hel. Viv. I, 112.—W. G. Binney, Terr. Moll. IV, 110.

Hyalina subplana, Tryon, Am. Journ. Conch. II, 250, pl. iv, f. 23 (1866).

Eastern Tennessee and Pennsylvania, in mountainous regions.

The only American species which this shell can be said to resemble is *Z. inornata*, which in size and color is quite like it, and at first sight may be taken for it. It differs from it in the following particulars: The upper and lower surfaces are both more flattened, and the outline is a more perfect circle. The number of whirls, in specimens of the same size, is greater by nearly one volution. The surface of the whirls is less rounded; the last whirl expands but very little towards the aperture; the base is broader, less indented, and very flat; the umbilicus is rounder, and better defined; and the aperture is not thickened within, by a white, testaceous deposit.

Zonites inornata, Say.—Shell depressed; epidermis yellowish horn-color, smooth, shining, with very minute lines not breaking the smoothness of the surface; whirls five; suture not much impressed; aperture transverse, scarcely oblique, obliquely-lunar, with a thick, white, testaceous deposit around its whole inner surface, a little distant from the margin; peristome thin, acute, fragile, its ends somewhat converging, the columellar margin reaching to the centre of the base, subdilated above; umbilicus small; base rather flattened, indented at the centre. Greater diam. 16, lesser 12½; height 6 mill.

Fig. 518.

Zonites inornata.

Helix inornata, Say, Journ. Acad. Nat. Sci. Philad. II, 371 (1821); Binney's ed. 24.—Binney, Bost. Journ. Nat. Hist. III, 419, pl. xxi, f. 3 (1840); Terr. Moll. II, 227, pl. xxxiv.—DeKay, N. Y. Moll. 39 (1843).—Adams, Vermont Mollusca, 161 (1842).—Pfeiffer, Mon. Hel. Viv. I, 84; IV, 48.—W. G. Binney, Terr. Moll. IV, 109.—Morse, Amer. Nat. I, 314, f. 19, 21, 22 (1867).

Helix gluphyra, Pfeiffer, olim, Symbolæ, II, 29, excl. syn. *fuliginosa*; Mon. Hel. Viv. I, 57.—Reeve, Con. Icon. 667.—Not Say.

Helix inornata, Binney, not Say, Bland, Ann. N. Y. Lyc. VII, 127.

Hyalina inornata, Tryon, Am. Journ. Conch. II, 249, pl. iv, f. 22 (1866).

From North Carolina to Kentucky through the States bordering on the great lakes. In the western parts of New England it is found, but very rarely.

Animal with head, neck, and eye-peduncles bluish-black; foot whitish. Eye-peduncles long and slender. A marginal furrow

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extending along the edges of the foot, and uniting above and before its posterior termination. Behind the junction is a prominent, subconical, bluish-white gland, on the extremity of the foot.

Fig. 519.

Zonites inornata, var.

Fig. 518 represents the usual form of the species. A more globose form is figured in Fig. 519. It was found in the mountains near Asheville, Buncombe County, North Carolina, by Dr. Ravenel.

The shell which is described above is well known in collections, and not easily confounded with any other. It has been unfortunate in its synonymy, whose history is treated at length and explained in the fourth volume of the Terrestrial Mollusks and Annals of New York Lyceum quoted above.

I have in my collection a curious specimen from the Pennsylvania mountains in which are three well-developed sharp tooth-like processes on the internal thickened margin of the peristome.

Fig. 520.

Jaw of *Zonites inornata*.

Jaw strongly arcuate, ends rapidly attenuated; anterior surface striated; concave margin smooth with an acute median projection.

Lingual membrane with 37 rows of forty-seven (23—1—23) teeth each; centrals long, slender, tricuspid; laterals eight only, stouter, bicuspid; uncini aculeate and curved.

Fig. 521.

Lingual dentition of *Zonites inornata*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8673	2	.....	W. G. Binney.	Cab. series.
8713	5	Western States.	W. Stimpson.	.....
8761	2	Ohio.	"	.....

Zonites sculptilis, BLAND.—Shell scarcely perforate, suborbicular, depressed, subpellucid, pale horn-color above, of lighter shade beneath,

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shining, with regular, subequidistant, impressed transverse lines, those on the last whirl extending over the periphery, and converging in the umbilical excavation; spire very little elevated, scarcely convex; whirls seven, planulate, the last rapidly increasing, equal at the aperture to one-third the diameter of the shell, beneath flattened, and little excavated in the umbilical region; suture lightly impressed; aperture scarcely oblique, depressed, transverse, lunate; peristome simple, acute, sinuate, the columellar margin very rapidly and narrowly reflected over, and almost entirely covering the very small perforation. Greater diam. 12½, lesser 11; height 5 mill.

Fig. 522.

Zonites sculptilis.

Helix sculptilis, Bland, Ann. N. Y. Lyc. VI, 279, pl. ix, f. 11–13 (1858).—W. G. Binney, Terr. Moll. IV, 110, pl. lxxvii, f. 15.—Pfeiffer, Mal. Blatt. 1859, 5.

Hyalina sculptilis, Tryon, Am. Journ. Conch. II, 249, pl. iii, f. 18 (1866).

Anantehely Mountains, North Carolina.

In sculpture it is closely allied to *Hyalina indentata*, of which it might almost be termed a gigantic variety, but the impressed striæ are more numerous, and closer together. The form of the aperture is very near that of *Z. inornata*.

Zonites elliotti, Redfield.—Shell with rather a narrow umbilicus, depressed-orbiculate, with fine transverse striæ, greenish horn-colored, hardly translucent, shining beneath; spire convex but not much raised; whirls five, rather convex, last one sometimes very slightly depressed at the aperture; suture deeply impressed; aperture very oblique, lunate-circular; peristome a little sinuate, acute, but thickened within. Greater diam. 9, lesser 8; height 4 mill.

Fig. 523.

Zonites elliotti.

Helix elliotti, Redfield, Ann. N. Y. Lyc. V, 170, pl. ix, f. 8–10 (1856).—Gould, Terr. Moll. III, 23.—W. G. Binney, Terr. Moll. IV, 116, pl. lxxvii, f. 18.

Macrocyclis elliotti, Tryon, Am. Journ. Conch. II, 246, pl. iii, f. 10 (1866).

Mountains of Georgia and North Carolina.

Animal with a distinct caudal mucous pore.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8678	3	Georgia.	W. G. Binney.	Teste Redfield. Original lot. Cab. ser.

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Subgenus VENTRIDENS.

Shell subperforate or umbilicated, orbicularly convex, diaphanous horn-color; glassy, more or less wrinkled; whirls 5–7; aperture lunar, almost always furnished at its base with fold-like denticles not reaching the margin; peristome simple, acute. Animal with a caudal mucus pore.

Animal (of *Z. suppressa*) bluish-black, darker on the head, eye-peduncles, and neck; eye-peduncles long and filiform, tentacles short. Length twice the diameter of the shell. On the upper surface of the extremity of the foot is a longitudinal fissure or furrow, from which mucus exudes in great quantities, and which the animal shuts and closes at will.

Fig. 524.

Tail of *Zonites suppressa*, enlarged.

The species comprising the group for which I propose the name *Ventridens* are distinguished by the caudal mucus pore only from those of the subgenus *Gastrodonta*.

Zonites gularis, Say.—Shell subperforated, subconical; epidermis shining, pale yellowish horn-color; spire sometimes tending to a point, at other times obtuse; whirls seven or eight, very minute at the apex, increasing in diameter regularly and gradually, until they reach the aperture, with strongly marked, curved wrinkles; suture impressed and distinct; aperture transverse, not much expanded; peristome simple, thin at its edge, within thickened with a white, testaceous deposit; base flat, indented in the centre, near the aperture yellowish-white and opaque; umbilicus small and rounded in young shells, obsolete or diminished to a mere point in older ones; within the base of the aperture are one or two lamelliform, elongated, nearly parallel teeth, one near the base, the other more central. Greater diam. 8, height 5 mill.

Fig. 525.

Zonites gularis.

Helix gularis, Say, Journ. Acad. Nat. Sci. Philad. II, 156 (1822); Binney's ed. 18.—Binney, Bost. Journ. Nat. Hist. III, 408, pl. xi, f. 1 (1840); Terr. Moll. II, 251, pl. xxxvii, f. 3, 4.—DeKay, N. Y. Moll. 46 (1843).—Ferussac, Hist. pl. li, a, f. 4 (?).—Pfeiffer, Mon. Hel. Viv. I, 183, excl. β; Symbolæ, II, 29, excl. β; in

CHEMNITZ, ed. 2, II, 201, tab. ci, f. 5–8.—W. G. BINNEY, Terr. Moll. IV, 122.—MRS. GRAY, Fig. Moll. An. pl. cxci, f. 4, ex Bost. Journ. —H. & A. ADAMS (*Gastrodonta*), Gen. Rec. Moll. pl. lxxi, f. 4 (no descr.).—REEVE, Con. Icon. no. 719 (1852).

Helix bicostata, PFEIFFER, Mon. Hel. Viv. I, 182; Symbolæ, III, 697 (1852); in CHEMNITZ, ed. 2, II, 196, pl. c, f. 21–23 (1846).—REEVE, *l. c.*

Gastrodonta gularis, TRYON, Am. Journ. Conch. II, 257, pl. iv, f. 39 (1866).

It is found from Pennsylvania and Ohio to the Gulf of Mexico. Also in the postpleiocene of the Mississippi Valley.

There is a variety with an open umbilicus.

Lingual membrane with 88 rows of (38—1—38) teeth each;

Fig. 526.

Lingual dentition of *Zonites gularis*.

centrals with one long central and two short lateral cusps; laterals bicuspid; uncini thorn-shaped.

Tail with a mucus pore.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8682	6	Alabama.	W. G Binney.	Cab. series.
8683	9	Georgia.	Dr. J. Lewis.	"
8737	4	Ohio.	W. Stimpson.	.....

Zonites suppressa, SAY.—Shell convex depressed, thin, pellucid: epidermis polished, yellowish horn-color; spire flat; whirls six, with crowded, minute, oblique striæ; suture impressed, distinct; aperture transverse, not expanded; peristome simple, thin at its edge, thickened within; base rather convex, near the aperture opaque, yellowish-white; umbilicus small, but rounded and distinct, in young shells, obsolete or hardly apparent in older ones; within the peristome are one or two lamelliform, elongated, oblique teeth. Greater diam. 5, lesser 4; height 2 mill.

Fig. 527.

Zonites suppressa.

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Helix suppressa, Say, New Harm. Diss. II, 229 (1829); Descr. 14; Binney's ed. 36.—Binney, Bost. Journ. Nat. Hist. III, 410, pl. xi, f. 3; Terr. Moll. II, 253, pl. xxxvii, f. 1.—DeKay, N. Y. Moll. 38, pl. iii, f. 24 (1843).—Reeve, Con. Icon. 723.—W. G. Binney, Terr. Moll. IV, 122.—Morse, Amer. Nat. I, 411, f. 25 (1867).—Pfeiffer, Mon. Hel. Viv. IV, 153.

Helix gularis, var. *β*, Pfeiffer, in Chemnitz, ed. 2, &c. See *Z. gularis*.

Gastrodonta suppressa, Tryon, Am. Journ. Conch. II, 258, pl. iv, f. 41 (1866).

Fig. 528.

Jaw of *Zonites cuppressa*.

Animal (see p. 292).

Jaw strongly arcuate, ends rounded, anterior surface striated; concave margin smooth, with a stout, rounded, blunt, median projection.

From Florida to New England.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
7943	2	Washington, D. C.	W. Stimpson.	.....
8586	2	Pennsylvania.	W. G. Binney.	.....
8758	3	Western States.	W. Stimpson.	.....
8787	2	Ohio.	.....	.....

β. Mantle covering the whole of the back. Respiratory chamber small, thin, in the front of the body, separate from the mantle. Head without any grooves. Eye-peduncle and tentacle distinct.

Family PHILOMYCIDÆ.

Lingual membrane very broad, teeth uniform, in numerous close, straight, transverse rows, the central large, obtusely conical, broad, laterals the same, the inner ones surmounted by a pointed apex.

Jaw horny, arcuate, strongly striated, its extremities blunt, concave margin irregular, scarcely bluntly projecting in the centre, vertically convex in the middle.

Animal limaciform, elongated, tapering behind. Eyes at the end of retractile cylindrical peduncles; tentacles short. Mantle thin, large, entirely covering the back. Respiratory orifice on the right side near the head, above the edge of the mantle. Foot narrow, elongate, simple posteriorly, extending beyond the mantle; no locomotive disk. Vent a little above

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and before the respiratory orifice. Male and female organs with the same orifice, behind and below the right eye-peduncle.

No internal shell.

The Asiatic genus *Meghimatium* is also referred to this family, it being by some considered identical with the strictly American genus *Tebennophorus*.

TEBENNOPHORUS, Binn.

Body somewhat flattened, terminating obtusely, or in a somewhat truncated form. Back convex, more flat when fully extended. Integuments with irregular vermiform glands, anastomosing with each other, and having a general longitudinal direction. Mantle covering the whole body. Locomotive disk expanded at its margin, and visible beyond the sides of the mantle; no median band. Respiratory orifice near the head. Anal orifice contiguous to, and a little above and in advance of the pulmonary orifice. Orifice of organs of generation behind and below the eye-peduncle. Without terminal mucus pore.

Fig. 529.

Tebennophorus carolinensis.

Fig. 530.

Jaw of *Tebennophorus carolinensis.*

Jaw horn-colored, arcuate, with a slightly denticulated or irregular concave margin, bearing a blunt, slightly projecting beak, terminations blunt; the anterior face is convex, without a decided median carina, and strongly striate.

The lingual membrane is very broad, composed of teeth of a short, conical form, the centrals symmetrical and smaller, the laterals inclined towards the central; apex of each sharper.

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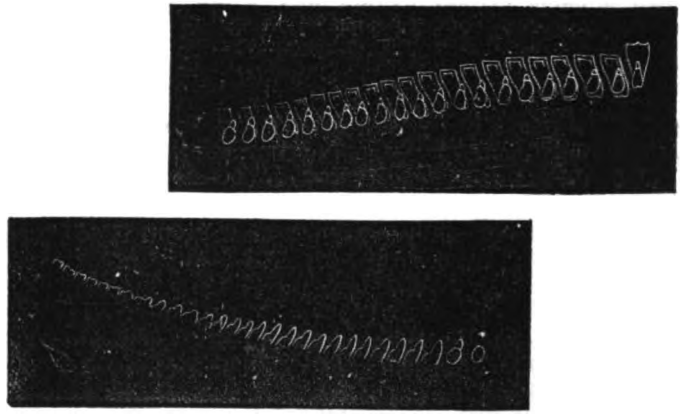
Fig. 531.



Lingual dentition of *Tebennophorus carolinensis*.

The internal rudimentary, nail-like shell described by Dr. Gray, has not been noticed by any American author.

The habits of the genus are similar to those of the native species of *Limax*.

Beside the two species found in this country one has been described from Costa Rica by Mörch (Mal. Blatt. VI, 110).

This genus was first described, in 1842, by Binney (Bost. Journ. Nat. Hist. IV, 163), under the name of *Tebennophorus*. No other descriptions of it have been published. The three species of it have been referred by various authors to other genera, such as *Limax*, which differs in having a small shield-like mantle, a different shaped jaw, &c.; and to *Philomycus*, a genus distinguished by the absence of a mantle. The latter genus probably existed only in the fertile imagination of Rafinesque, the same "habitat" where flourished *Tremesia* and *Deroceras*.[1]

Ferussac repeats (1823) the description of Rafinesque, but

[1] See descriptions of these singular animals in the new edition of Rafinesque's Complete Conchological Writings. Baillière, New York, 1864. See also Terr. Moll. I, 51, 52.

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never had seen an individual of the genus. He suggests that *Limax carolinensis*, Bosc, may belong to it, judging from the figure alone. Gray, H. & A. Adams, and Mörch adopt the name of *Philomycus*, on the supposition that Rafinesque had before him a *Tebennophorus* when describing *Philomycus* (in 1820). It may be he had, but as he did not make it so appear, I have preferred adopting the first name evidently applying to it.

Meghimatium, or *Incillaria*, an Asiatic genus, is by some considered identical with *Tebennophorus*.

Tebennophorus carolinensis, Bosc.—Color of upper surface whitish, or yellowish-white, variegated with clouds and spots of brownish and blackish, so arranged as to form three ill-defined longitudinal bands, one on the centre of the back, and one on each flank, extending from the head to the posterior extremity, anastomosing more or less with each other, and having smaller spots of the same color between them; inferior margin white, or yellowish; foot whitish. Mouth surrounded with a circular row of papillæ. Body elongated, subcylindrical, flattened towards its posterior extremity, which is obtuse; eye-peduncles one-fourth of an inch long, brownish or blackish, stout, terminating in a bulb; ocular points on the superior part of the bulb; tentacles immediately below the eye-peduncles, white, very short, nearly conical. Mantle fleshy, covering

Fig. 532.

Tebennophorus carolinensis.

the whole body, its anterior edge tinged with brownish, and falling in a slight curve between the two eye-peduncles, reaching on the sides to the margin of the foot; posterior extremity rounded; cuticle covered with irregular vermiform glands, anastomosing with each other, and having a general tendency to a longitudinal direction, with shallow furrows between, lubricated with a watery mucus, and susceptible of contractions which produce a slow, undulatory motion, like the flowing of water, over the whole surface. Foot whitish, extending a little beyond the mantle posteriorly, showing a whitish flattened border. Orifice of the organs of generation on the right side, at a little distance behind and below the eye-peduncles. Respiratory orifice large, on the right side, one-fourth of an inch behind the origin of the eye-peduncle; anal orifice in close contact, a little above and in front of it; above the respiratory orifice, on the

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back, is a deep curved furrow, running upwards and backwards. Locomotive band not distinguished from the lower surface of the foot. Greatest length, when fully extended, 100 mill.; ordinary length 75.

Limax carolinensis, Bosc, Vers de Buffon de Deterville, 80, pl. iii, f. 1.—Ferussac, Hist. 77, pl. vi, f. 3.—Deshayes, in Lam. 2d ed. VI, 719; ed. 3, III, 264 (1839).—Mrs. Gray, Fig. Moll. An.

Limax carolinianus, De Roissy, Buffon de Sonnini, V, p. 185 (An XIII).

Limax togata, Gould, Inverteb. Mass. 3 (1841).

Philomycus carolinensis, Ferussac, Tab. Syst. 15.—Pfeiffer, Brit. Mus. Cat. 158.—H. & A. Adams, Gen. II, 220.—Chemn, Man. de Conch. I, 469, f. 3479 (1859).

Tebennophorus carolinensis, Binney, Bost. Journ. Nat. Hist. IV, 171 (1842); Terr. Moll. II, 20, pl. lxiii, f. 1, 2.—Adams, Shells of Vermont, 163 (1842).—DeKay, N. Y. Moll. 24, pl. iii, f. 1 (1843).—Wyman, Bost. Journ. Nat. Hist. IV, 410, pl. xxii (1844), anat.—Leidy, T. M. U. S. I, 250, pl. iii (1851), anat.—W. G. Binney, Terr. Moll. IV, 3.—Morse, Journ. Portl. Soc. I, 7, f. 3; pl. iii, f. 4 (1864).

Limax marmoratus, DeKay, Cat. N. Y. An. 31, no descr. (1839).—Lesley, Shells of Conn., Sill. Journ. [1] XLVIII, 279, no descr.

From Canada to Texas.

In this species the head never projects beyond the mantle. The tentacles and eye-peduncles are contractile, and retractile, as in the other slugs. When handled it secretes from the skin a thick, milky, adhesive mucus. Small individuals suspend themselves by a thread. We have noticed its posterior extremity curved upwards when the animal was in motion; at other times flattened and expanded, and again very much corrugated, and apparently truncated; sometimes there *appear* to be one or more mucous glands at this part, and the secretion of mucus from it is more plentiful than from other parts of the body. The mantle is not cleft from the respiratory foramen to the margin, as in most of the slugs, but is provided with a deep furrow or canal running from the orifice to the edge of the mantle below it.

It is very inactive and sluggish in its motions. It inhabits forests, under the bark, and in the interior of the decayed trunks of fallen trees, among which it is particularly partial to the Basswood, *Tilia Americana*.

The variations from the common coloring are numerous. We have already observed the following varieties:—

a. Whitish, without clouded spots, tending to grayish.

b. Whitish, slightly clouded longitudinally.

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c. Irregularly clouded with brownish, without any tendency to longitudinal arrangement.

d. With three distinct rows of large clouded spots.

e. With great numbers of fine black spots.

f. Gray, with a line of minute black dots along each side.

g. Blackish-gray, with black lines along each side, and an indistinct line down the middle of the back.

The appearance of the surface of the mantle is constantly changing, from the play of light on its lubricated eye-peduncles, tentacles, and furrows, which are in almost ceaseless motion.

There can be no doubt that this is the animal originally described by Bosc under the name of *Limax carolinensis*, though his description is so imperfect that it can only be recognized by the arrangement of colors which belongs to it. His original drawing, engraved in Ferussac's work, is a tolerably accurate representation of one of its varieties. He makes no mention of the mantle, and it does not appear in the figure.

An individual of this species kept in confinement, deposited about thirty eggs, June 20, 1843; on the 10th July the young made their way out of the shell. The eggs were semi-transparent, oval, about one-fifth of an inch in the greatest diameter. The young when excluded were more than a fourth of an inch long, semitransparent and gelatinous; eye-peduncles and tentacles bluish-black at base, black at tip, the latter very minute and hardly visible. Body broad; back whitish, with two distinct rows of minute black dots down the middle, and other scattering spots on the sides. No perceptible furrow between the mantle and body. They increased very rapidly in size, and in a few days were four times as large as when hatched.

Fig. 533.

Jaw of *Tebennophorus carolinensis.*

Jaw short, broad, arched, light horn-colored; anterior surface convex, but having no distinct vertical carina on the centre, its most anterior point. Concave margin irregular, without a distinct acute median projection, though sometimes bluntly prominent. Extremities attenuated. The whole anterior surface covered with converging vertical striæ and arched striæ.

Lingual membrane with 115 rows of one hundred and thirteen teeth each (56—1—56); centrals conical, surmounted by a

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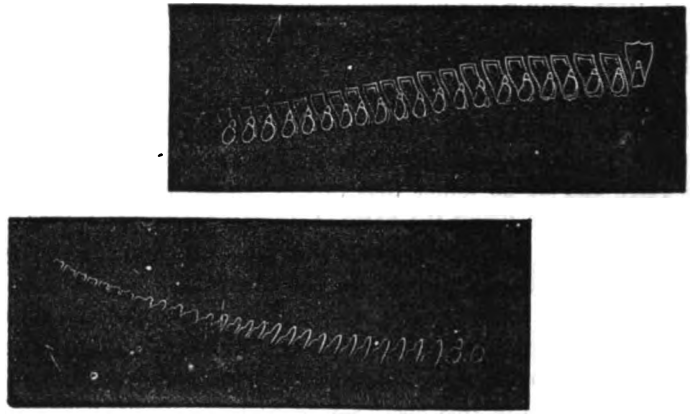
sharper point; laterals of the same shape, but narrower, becoming modified into bicuspid and papillæ-like uncini.

Fig. 534.



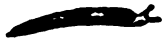
Lingual dentition of *Tebennophorus carolinensis*.

Of the synonyms I have quoted, *Limax togata* is said by Gould (Otia, 182) to be identical; and *Limax marmoratus*, of DeKay, I have ascertained to be the same from the correspondence of my father with Dr. Newcomb.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8471	5	Middle States.	.....	Alcohol.
8578	1	.....	W. G. Binney.	Cab. series.

Tebennophorus dorsalis, Binney.—Color of upper surface ashy, with a shade of blue, an interrupted black line extending down the centre of the back; eye-peduncles black, about one-eighth of the length of the body; tentacles blackish, very short. Body cylindrical and narrow, terminating posteriorly in an acute point; base of foot white, very narrow, its separation from the body not well defined. Upper surface covered with elongated and slightly prominent glandular projections, the furrows between indistinct. Respiratory orifice very minute, situated on the right side, about one-eighth of an inch behind the insertion of the eye-peduncle. The mantle is closely connected with the body. Length 18 mill.

Fig. 535.



Tebennophorus dorsalis.

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Philomycus dorsalis, Binney, Bost. Journ. Nat. Hist. IV, 174 (1842); Proc. Bost. Soc. Nat. Hist. 1841, 52.—Adams, Shells of Vermont, 163 (1842).—Gray & Pfeiffer, Brit. Mus. Cat. 159.

Limax dorsalis, DeKay, N. Y. Moll. 22 (1843).

Tebennophorus dorsalis, Binney, Terr. Moll. II, 24, pl. lxiii, f. 3 (1851).—W. G. Binney, Terr. Moll. IV, 31.

Pallifera dorsalis, Morse, Journ. Portl. Soc I, 8, f. 5; pl. iii, f. 6 (1864).

Vermont and Massachusetts.

This animal is found in woods and forests, in the soil under decaying trunks and logs. It is lubricated by a watery mucus which is not secreted in quantity sufficient to preserve its life when removed from its native haunts and exposed to the air. It is even difficult to preserve it long enough for examination, as it becomes dry, diminishes in bulk more than one-half, and dies. We have seen but three specimens. They were very active in their movements, and one of them suspended itself by a thread of mucus, in the manner of the *Limaces*. Our specimens were found in Vermont. Dr. Gould has recognized this or a similar species near Boston.

It is quite possible that this is one of the species described by Rafinesque, but from the poverty of his descriptions, we are unable to identify it with either of them.

When Dr. Binney for the first time procured this animal, not being able to distinguish the separation of the margin of the mantle from the edge of the foot, he felt assured that it must be a species of Rafinesque's genus *Philomycus*, and he accordingly described it as such. Having an opportunity since that time of examining several of them, he noticed, on throwing some of them into alcohol for preservation, that the contraction, caused by the liquor, revealed and detached the mantle from its adhesion. Its characters, therefore, correspond with those of the present genus. It is by no means certain, however, that it may not prove to be the young of the preceding species.

Fig. 536.

Jaw of *Tebennophorus dorsalis?*

Since the above was written, Morse has published (Journ. Portl. Soc. I, 8) a figure of the jaw and lingual membrane of this species which differ sufficiently from those of *T. carolinensis* to warrant its generic distinction. I have hesitated to adopt his name *Pallifera* until

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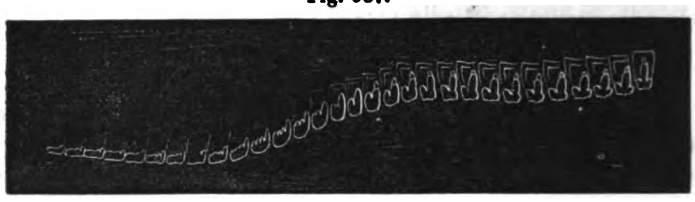
his observations shall be confirmed by others.[1] He describes the jaw as arcuate, ends rounded, blunt, anterior surface with stout costæ, strongly denticulating the concave margin. The lingual

Fig. 537.



Lingual dentition of *Tebennophorus dorsalis?*

membrane he describes as composed of 115 rows of one hundred and thirteen teeth each (56—1—56); centrals tricuspid, laterals bicuspid, uncini with three or four cusps or serrate.

Spurious Species of Tebennophorus, &c.

Tebennophorus bilineatus, Cart., United States, of Gratelоup (Dist. Geog. p. 30), is unknown to me.

Philomycus quadrilus, *fuscus*, *oxyrus*, and *flexuolaris* of Rafinesque (see Terr. Moll. I, p. 51 and 52), and *Philomycus* (*Eumelus*) *lividus* and *nebulosus* are placed in the same genus as *Tebennophorus carolinensis* by Gray and Pfeiffer, Brit. Mus. Cat. They are unknown to me.

B. *Head, eye-peduncles, and tentacles simple, contractile.*

Teeth numerous, four-sided, close on the lingual membrane.

Family VERONICELLIDÆ.

Lingual membrane very broad, teeth uniform, in numerous close, straight transverse rows, the centrals small, the laterals large, conical, pointed.

Jaw (of *Veronicella floridana*) narrow, arched, ribbed. Animal limaciform, elongate-ovate. Mouth not furnished with a buccal veil. Eyes at the end of contractile peduncles; tentacles bifid, non-retractile. Mantle greatly extended, cori-

[1] The more so as he figures the jaw and tongue of an *Arion* for those of *Limax agrestis*. I have detected errors of my own of this kind, arising from incorrectly labelling extracted jaws and tongues.

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aceous, smooth, covering the back; orifice of respiratory sac on the right side under the mantle margin. Foot narrow, with a locomotive disk, simple posteriorly. Vent distinct, posterior. Orifices of reproductive organs widely separated; male organ behind the right eye-peduncle, female orifice midway on the right side beneath the mantle.

Shell none.

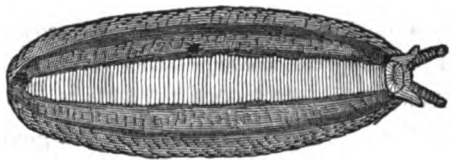
At present but one genus is known of this family, found also in South America, the West Indies, India, South Africa, and the Philippines.

The *Veronicellidæ* are most nearly allied to the *Onchidiidæ*, but are readily distinguished by their bifid tentacles. They are truly terrestrial, being found in damp places in the forests (see *Veronicella*).

VERONICELLA, Blainville.

Body oblong oval when contracted, more or less linear when extended; mantle covering the whole body; foot narrow, wrinkled transversely as if composed of numerous rings, simple posteriorly; head distinct, and capable of being retracted under the mantle; buccal mass with a jaw and with papillæ arranged around the mouth; tentacles two, bifid, unequal, contractile; eye-

Fig. 538.



Veronicella floridana.

peduncles long and slender, annulated, obtuse and oculiferous at tip. Pulmonary cavity on the right side, at about two fifths the length of the animal, and opening, by means of a tube running along the side, at the posterior extremity, between the mantle and the free point of the foot, in company with the anal opening. Organs of generation separate and distant, the male organ pro-

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truding at the base of the right tentacle; the female opening about the middle of the right side. Mucus pore none.

Fig. 539.

Jaw of *Veronicella floridana.*

Shell none.

Jaw slightly arcuate, long, narrow, with numerous ribs, margin pectinated.

Lingual ribbon (of *V. floridana*) very broad (48—1—48). Central teeth very small, triangularly-conical, acute; first twenty-nine laterals uniform, but decreasing in size as they pass off laterally, conical, acute, the base with a narrow

Fig. 540.

Lingual dentition of *Veronicella floridana.*

lateral extension; the next fourteen comprised of a more obtuse denticle rising obliquely from the centre of the plate to which they are attached, without lateral extension; the balance becoming in form and size very much modified as they approach the margin.

There are but few known species of this genus, found in South America, the Philippines, South Africa, and the West Indies. Our single Florida species belongs rather to the fauna of South than North America.

The name *Vaginula*, sometimes used for the genus, was published several years after *Veronicella*.

The anatomy of *Veronicella* is given in vol. 1 of Terrestrial Mollusks U. S.

The contractility of the animal is very great. When extended it is very long and slender, and smooth or faintly reticulated, three or four times as long as when contracted; in which latter state it has an oblong form, equally rounded at both ends, and its surface is coarsely wrinkled, granular or tuberculated. The

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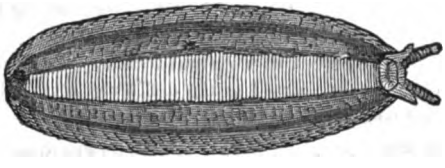
tentacles are generally bifurcate at tip, or rather there is a supplementary tentacle or spur, which can be protruded just short of the point of the tentacle; sometimes the tips are said to be even palmate.

It lives in families under stones and trunks of trees, and sometimes buried in the earth. It is capable of retiring from damp places, and sometimes inhabits very dry localities. It issues forth in the night and on wet days, when it may he found upon trees. Its movements are very rapid; no slimy traces are left behind them as in the case of the *Limaces*.

The eggs are large and oval, ten or fifteen being joined together in a necklace-like gelatinous thread, which is coiled and more or less covered with mucus.

Veronicella floridana, Binney.—Animal (contracted in alcohol) elongated oval, about four times as long as broad, the sides very slightly curved, and the extremities circularly rounded; back convex, regularly arched in every direction; surface very slightly wrinkled; color dark ashy gray, mottled with black, with a median whitish line, on each

Fig. 541.



Veronicella floridana.

side of which, at about one-third the distance towards the margin, is an ill-defined stripe of black; beneath drab colored; foot occupying about one-third the width; eye-peduncles short, annulated, the tentacles not very distinctly bifurcate. Length 56, breadth 18 mill.

Vaginulus floridanus, Binney, Terr. Moll. II, 17, pl. lxvii (1851).—Leidy, T. M. U. S. I, 251, pl. iv, anat.

Veronicella floridana, Chenu, Man. de Conch. I, 472, f. 3501, 3502 (1859).

Fig. 542.

Jaw of *Veronicella floridana.*

Jaw arcuate, narrow, ends rounded, posterior surface with 24 ribs, crenulating the concave margin.

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The jaw and lingual membrane have been figured and described on p. 304.

Fig. 543.

Lingual dentition of *Veronicella floridana*.

Has been found at a single locality, namely, at Charlotte Harbor on the west coast of Florida.

The above description is obviously very imperfect, inasmuch as it is drawn from a dead and greatly contracted specimen, and as no notes of the animal have been found excepting as to its locality. The characters, however, are sufficiently marked to distinguish the species. From its slight reticulation, in its contracted state, it must have been quite smooth when extended. Its colors are similar to those of *Tebennophorus carolinensis*, and similarly distributed. The tentacles are not very conspicuously spurred, but the puncture for the protrusion of a spur is manifest.

Spurious Species of Veronicella.

The following species are catalogued by Gratelou among the American *Vaginuli* (Dist. Geog. des Limaciens, 22). They were all described by Rafinesque, and by him placed in his genus *Philomycus*. From the general inaccuracy of that author, as well as the deficiency of the descriptions, I think they should be excluded from this or any genus:—

Vaginulus flexuolaris,
Vaginulus fuscus,
Vaginulus oxyurus,
Vaginulus quadrilus.

Family ONCHIDIIDÆ.

Lingual membrane broad; teeth uniform, similar, in numerous, straight, transverse rows; the centrals single, short, narrow, equilateral; the laterals numerous, nearly equilateral, with a broad, flat, subcentral tip. Mouth provided with a buccal veil.

No horny jaws.

Animal ovate, limaciform.

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Eyes at the end of non-retractile, cylindrical peduncles; tentacles none. Mantle coriaceous, large, shield-like, entirely covering the back; respiratory orifice posterior, at the right side, under the margin of the mantle. Foot narrow, elongate, simple posteriorly, with a locomotive disk. Vent separate from the respiratory orifice, posterior. Male organ under right eye-peduncle; female orifice at posterior extremity of body.

Shell none.

But few species of this family have been discovered. They are found to belong to several genera besides the one represented on our Pacific coast, and are variously distinguished by the characteristics of the mantle, smooth or granular in *Onchidella*, with arbusculiform tufts in *Peronia*, or with a large central tubercle and radiating striæ in *Buchanania*.

In their habits they are quite marine.

ONCHIDIUM, Buch.

Body oblong or oval, obtusely rounded behind, truncated before; mantle covering the whole body and reflected under the body, coriaceous, convex, tubercular; foot broad, simple posteriorly; mouth provided with papillæ; oral appendages lobate, simple, undivided; tentacles none; eyes at the end of long, club-shaped contractile peduncles. Respiratory orifice posterior, at the right side. Anal orifice separate, posterior; male organ under the right tentacle, female orifice at the posterior extremity of the body.

Fig. 544.

Onchidium carpenteri.

Shell none.

Jaw none.

Lingual membrane —?

Onchidium carpenteri, W. G. Binn.—Among the mollusca from the Straits of De Fuca, Mr. Carpenter has detected five specimens of a shelless mollusk, which evidently belong to the genus *Onchidium*. Being preserved in alcohol, it is difficult to obtain any more satisfactory specific characters than the following: The body is oblong, with its extremities circularly rounded; the upper surface is regularly arched;

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below, quite near the edge, the border of the mantle is readily distinguished, most of the under surface is occupied by the broad, distinct locomotive disk; the body is uniformly smoke-colored; in size the individuals vary considerably, the length of the largest being 5, the extreme breadth 3 mill.

Fig. 545.

Onchidium carpenteri, enlarged.

Onchidium carpenteri, W. G. Binney, Proc. Acad. Nat. Sci. Philad. 1860, 154.

Fig. 545 is drawn from one of the specimens collected at Cape San Lucas. They were too much dried to permit of anything more satisfactory.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
4463	4	De Fuca.	.....	Cab. series.

[This completes the series of North American land snails. The fluviatile and marine genera will be found in Land and Fresh-Water Shells of North America, Part II.]

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ARRANGEMENT
OF
FAMILIES OF BIRDS.

[Adopted provisionally by the Smithsonian Institution.]

A. AMERICAN.

Sup-class I.—INSESSORES.

Order I.—Passeres.

(*Section Oscines.*)

1.	Turdidae,	The Thrushes.
2.	Cinclidae,	The Dippers.
3.	Saxicolidae,	The Saxicolas.
4.	Sylviidae,	The Warblers.
5.	Paridae,	The Titmice.
6.	Certhiidae,	The Creepers.
7.	Troglodytidae,	The Wrens.
8.	Motacillidae,	The Wagtails.
9.	Sylvicolidae,	The Wood-warblers.
10.	Hirundinidae,	The Swallows.
11.	Vireonidae,	The Greenlets.
12.	Ampelidae,	The Wax-wings.
13.	Laniidae,	The Shrikes.

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14. Caerebidae,	The Honey Creepers.
15. Tanagridae,	The Tanagers.
16. Fringillidae,	The Sparrows.
17. Alaudidae,	The Larks.
18. Icteridae, (Icterinae.)	The Orioles.
18. Icteridae, (Agelaeinae.)	The Starlings.
18. Icteridae, (Quiscalinae.)	The Crow Blackbirds.
19. Corvidae, (Garrulinae.)	The Jays.
19. Corvidae, (Corvinae.)	The Ravens and Crows.

(*Section Clamatores.*)

20. Dendrocolaptidae,	The Tree-creepers.
21. Pteroptochidae,	The Cock-wrens.
22. Formicariidae,	The Ant-catchers.
23. Tyrannidae,	The Tyrant Flycatchers.
24. Cotingidae,	The Chatterers.
25. Phytotomidae,	The Plant-cutters.

ORDER II.—STRISORES.

26. Momotidae,	The Sawbills.
27. Todidae,	The Todies.
28. Alcedinidae,	The Kingfishers.

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29. Galbulidae, The Jacamars.
30. Bucconidae, The Barbets.
31. Trogonidae, The Trogons.
32. Caprimulgidae, The Goatsuckers.
33. Cypselidae, The Swifts.
34. Trochilidae, The Humming Birds.

ORDER III.—ZYGODACTYLI.

35. Cuculidae, The Cuckoos.
36. Rhamphastidae, The Toucans.
37. Capitonidae, The Thick-heads.
38. Picidae, The Woodpeckers.
39. Psittacidae, The Parrots.

ORDER IV.—ACCIPITRES.

40. Strigidae, The Owls.
41. Falconidae, (Aquilinae.) The Eagles.
41. Falconidae, (Falconinae.) The Falcons.
41. Falconidae, (Accipitrinae.) The Hawks.
41. Falconidae, (Buteoninae.) The Buzzard Hawks.
41. Falconidae, (Milvinae.) The Kites.
41. Falconidae, (Polyborinae.) The Caracaras.

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42. Vulturidae, The Vultures.

ORDER V.—PULLASTRAE.

43. Columbidae, The Pigeons and Doves.
44. Penelopidae, The Guans.
45. Cracidae, The Curassows.

SUB-CLASS II.—CURSORES.

ORDER VI.—GALLINAE.

46. Chionididae, The Sheath-bills.
47. Thinocoridae, The Lark Partridges.
48. Meleagrididae, The Turkeys.
49. Tetraonidae, The Grouse.
50. Perdicidae, The Partridges.
51. Crypturidae, The Tinamous.

ORDER VII.—BREVIPENNES.

52. Struthionidae, The Ostriches.

ORDER VIII.—GRALLAE.

53. Charadriidae, The Plovers.
54. Haematopodidae, The Oyster-catchers.
55. Scolopacidae, The Snipes.
56. Phalaropodidae, The Phalaropes.
57. Recurvirostridae, The Avosets and Stilts.
58. Gruidae, The Cranes.
59. Tantalidae, The Ibises.

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60. Plataleidae, The Spoon-bills.
61. Ciconiidae, The Storks.
62. Cancromidae, The Boat-bills.
63. Ardeidae, The Herons.
64. Cariamidae, The Cariamas.
65. Palamedeidae, The Horned Screamers.
66. Psophiidae, The Trumpeters.
67. Rallidae, The Rails.
68. Phoenicopteridae, The Flamingoes.

Sub-class III.—NATATORES.

(*Section Lamellirostres.*)

Order IX.—Lamellirostres.

69. Anatidae,
(Cygninae.) The Swans.
69. Anatidae,
(Anserinae.) The Geese.
69. Anatidae,
(Anatinae.) The River Ducks.
69. Anatidae,
(Fuligulinae.) The Sea Ducks.
69. Anatidae,
(Merginae.) The Sheldrakes.

(*Section Simplicirostres.*)

Order X.—Steganopodes

70. Pelecanidae, The Pelicans.

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71. Sulidae.	The Gannets.
72. Tachypetidae,	The Frigate Birds.
73. Graculidae,	The Cormorants.
74. Plotidae,	The Snake Birds.
75. Phaethontidae,	The Tropic Birds.

Order XI.—Longipennes.

76. Laridae, (Larinae.)	The Gulls.
76 Laridae, (Lestridinae.)	The Jaegers.
76. Laridae, (Sterninae.)	The Terns.
76. Laridae, (Rhynchopinae.)	The Razor-bills.
77. Procellariidae, (Diomedeinae.)	The Albatrosses.
77. Procellariidae, (Procellariinae.)	The Petrels.
77. Procellariidae, (Halodrominae.)	The Sea-runners.

Order XII.—Pygopodes.

78. Colymbidae,	The Divers and Loons.
79. Podicipidae,	The Grebes.
80. Alcidae,	The Auks.
81. Spheniscidae,	The Penguins.

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B.—OLD WORLD EXCLUSIVELY.

Sub-class—INSESSORES.

Order Passeres.

(*Section Oscines.*)

1. Muscicapidae, The Flycatchers.
2. Timaliidae, The Babblers.
3. Ploceidae, The Weaver Birds.
4. Sturnidae, The Stares.
5. Oriolidae, The Orioles.
6. Paradiseidae, The Paradise Birds.
7. Epimachidae, The Satin Birds.
8. Nectariniidae, The Honey Birds.
9. Brachypodidae, The Short-legged Thrushes.
10. Melliphagidae, The Honeysuckers.
11. Drepanidae, The Sickle Birds.

(*Section Clamatores.*)

12. Upupidae, The Hoopoes.
13. Menuridae, The Lyre Birds.
14. Pittidae, The Ant-thrushes.

Order Zygodactyli.

15. Musophagidae, The Plantain-eaters.
16. Coliidae, The Colies.

Order Strisores.

17. Bucerotidae, The Horn-bills.

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18. Meropidae, The Bee-eaters.
19. Coraciidae, The Rollers.
20. Leptosomatidae, The Leptosomes.

ORDER PULLASTRAE.

21. Megapodidae, The Big-feet.
22. Dididae. The Dodoes.

SUB-CLASS—CURSORES.

ORDER GALLINAE.

23. Pteroclidae, The Sand Grouse.
24. Rollulidae, The Roulouls.
25. Numididae, The Guinea-fowl.
26. Pavonidae, The Peacocks.
27. Phasianidae, The Pheasants.

ORDER BREVIPENNES.

28. Apterygidae, The Kiwis.

ORDER GRALLAE.

29. Dromadidae, The Runners.
30. Otididae, The Bustards.

[The classification of birds here presented is based essentially upon that of Prof. Lilljeborg, of Upsala (published in the Proceedings of the Zoological Society of London for January, 1866), and has been adopted provisionally in the arrangement of the birds in the museum of the Smithsonian Institution. It is also nearly the same as that of Dr. Sclater's Catalogue of American Birds, as far as the latter extends. The name of each family has been printed in large type on cards to serve as labels, and copies of any or all can be furnished at a moderate price, on application. The first list includes the generally accepted families of the neogaean—or new world—birds, embracing both those peculiar to America and those found also in the old world, and the second list enumerates the remaining, exclusively palaeogean—or old world—families.]

SMITHSONIAN INSTITUTION, WASHINGTON, *June*, 1866.

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CIRCULAR

TO

OFFICERS OF THE HUDSON'S BAY COMPANY.

THE Smithsonian Institution has been engaged for several years in the prosecution of researches relative to the climatology and natural history of the continent of North America. For this purpose the voluntary services of a large body of intelligent correspondents, distributed throughout the entire territory of the United States, have been secured, from whom records of changes of the weather, and other phenomena, with facts and specimens in natural history of much interest, have been obtained.

The observations thus accumulated have been reduced, and the results will shortly be published, both in tabular form and on maps, illustrating the lines of equal temperature: of rain at different points: the mean direction and intensity of the wind: the character of the land, whether forest or prairie, fertile or barren: the distribution of various animals and vegetables, etc. Reports have been issued, or are in preparation, embodying detailed monographic descriptions of the Algæ, the forest trees, the Vertebrata, insects, Mollusca, Crustacea, &c., of the continent; and efforts made generally to furnish a full and perfect account of its natural and physical history.

In the prosecution of these researches, a serious obstacle has been experienced in the lack of sufficient data from the region north of the boundary line of the United States, especially from its more northern portion. The isolated observations and collections, which have from time to time been received, have proved of great interest and importance; but the Institution now desires

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to receive communications, if possible, from all inhabited portions of North America, especially from the stations of the Hon. Hudson's Bay Company. And with this view it has obtained the sanction of the proper authorities for an application to the officers of the Company for assistance, as shown by the accompanying letter of Sir George Simpson, Governor of the H. B. Territory.

The attention of the friends of science is therefore respectfully invited to certain points, which will be referred to more fully hereafter. In an accompanying package will be found detailed instructions in regard to making and recording observations, and it is only necessary here to indicate a few subjects which are of more particular interest.

1st. The beginning and ending of storms of wind and rain, and the time when the sky is overcast. Records of this kind enable us to map the face of the heavens over a large surface of country, and to determine the extent of a cloud, or of falling rain, snow, &c.

Beside the regular variations of the meteorological instruments, special information is desired as to the occurrence of thunder storms; the time of day at which they take place; the direction from which they come; their duration and intensity; notice of trees or other objects which may be struck by lightning.

2d. Tornadoes, land and water-spouts, and whirlwinds. The width of the path along which the mechanical effects are produced; the direction of the path; the appearance of the tornado at a distance; the motion of the clouds over the head of the observer as the tornado approaches and as it recedes from him. Note whether any electrical phenomena are exhibited, such as thunder, lightning, and luminous appearances; the mechanical effects, prostration of trees, and translation of heavy bodies.

3d. The aurora borealis: time of its beginning and ending; time of the formation of arch, beams, and corona; and whether there is a dark cloud below the arch; and other points mentioned in the pamphlet of instructions.

4th. Time of early and late frosts, particularly first and last. Depth of ground frozen, in feet and inches; disappearance of frost from the ground.

5th. Time of closing and opening of rivers, lakes, streams, &c., and any other phenomena relating to temperature.

A single register of any one of these phenomena carefully made,

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may prove of great service in tracing the changes of weather over large districts of country; for example, a knowledge of the exact time at which a violent wind commences at a particular place may enable us, with similar observations at other localities, to trace the progress of the disturbance through its whole course from its beginning to its ending.

For more detailed instructions reference should be made to the accompanying blanks and pamphlets.

Of the blank registers two different classes are sent. Those marked No. 1 are intended to record observations with all the instruments, with spaces to include the reductions for "Force of Vapor" and "Relative Humidity," which need not be filled up unless the observer himself prefers to make the calculations, which will otherwise be made at the Institution.

Blanks No. 2 are intended for observers who have no instruments, excepting a thermometer; and if this instrument be broken, or the observer have none, valuable materials may still be furnished by filling up the other columns, and simply noting the beginning and ending of warm and cold spells.

In the accompanying package will also be found blanks for recording periodical phenomena of animal and vegetable life. Such records will be of especial interest, as showing the progress and development of the seasons, and the geographical distribution of species.

In the package will also be found detailed instructions in regard to the collecting and preparing objects of natural history. Specimens of the different animals will be particularly interesting, especially of the small mammals, as mice, moles, shrews, gophers, weasels, rabbits, ground squirrels, marmots, etc. Good skins and skulls of the barren ground bear, the musk ox, and the reindeer, are much wanted.

Attention is especially invited to the collecting of eggs of any and all kinds of the birds which may be met with. The species of most interest are the different eagles, hawks, and owls, snipes, sandpipers, plover, gulls, ducks, loons, grebes, etc. Care should be taken, as far as possible, to secure a parent bird of each set of eggs, for the purpose of identifying the species; either the entire skin being preserved, or at least the head, wing, and tail. If a parent cannot be obtained, the eggs should nevertheless be

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collected, and any information communicated which may serve to determine the species.

Skins of any divers or grebes in full spring plumage, of the large black grouse, of the ptarmigan, or willow grouse (especially in summer dress), of the different kinds of Canada or black-necked geese, and of any waders in full breeding plumage, and in fact of Arctic birds generally, will be very acceptable.

The different species of Salmonidæ, as salmon, trout, whitefish, and grayling, are particularly desired by the Institution. In the absence of alcohol, these may be skinned and dried. Fishes of all kinds, however, will be much valued.

Insects of all kinds will be highly prized, and, in fact, no object of natural history, however abundant and familiar, will be without its interest to the Institution.

If suitable opportunities occur for the transmission of any returns to these circulars, either of specimens or of observations, they should be sent directly to the Smithsonian Institution, Washington, D. C.; if not, they should be forwarded to the care of the Governor of the Hon. Hudson's Bay Company.

JOSEPH HENRY,
Secretary S. I.

SMITHSONIAN INSTITUTION, WASHINGTON, *April* 20, 1860.

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APPENDIX.

HUDSON'S BAY HOUSE, LACHINE, 31st March, 1860.

To the Officers of the Hudson's Bay Company's Service.

GENTLEMEN: Having been applied to by the Secretary of the Smithsonian Institution of Washington, for permission to invite the assistance of the Company's officers in conducting observations, having for their object the development of the physical and natural history of the northern part of this continent, I have very cheerfully acceded to the request, and take the present means of commending the object in view to your favorable consideration.

You are well aware of the desire of the Company to promote the interests of science by all the legitimate means in its power. In the present case, where so much may be done by systematic and conjoined action, over a widely extended territory, it will be gratifying to learn that information and materials of a valuable character have been supplied from the stations of the Company, and by the industry of its officers.

The accompanying circular and instructions, from Professor Henry, will explain more fully the objects of the Institution, and will be found to embrace all necessary information for your guidance.

I am, gentlemen,

Your obedient servant,

G. SIMPSON.

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SUGGESTIONS

RELATIVE TO

OBJECTS OF SCIENTIFIC INVESTIGATION

IN

RUSSIAN AMERICA.

SMITHSONIAN INSTITUTION,
WASHINGTON, *May 27th*, 1867.

Hon. JOHN F. HARTLEY,
Ass't Sec'y of the Treasury.

SIR: Your letter informing us that an expedition was to be sent to Russian America, and inviting suggestions as to scientific points worthy of attention, has been duly received, and I beg leave to enclose, in reply, the accompanying memoranda relative to meteorology, ethnology, and natural history, which we should be pleased to have placed in the hands of the gentlemen composing the party. The meteorological suggestions were prepared by myself, the ethnological by Mr. George Gibbs, and those which relate to natural history by Professor Baird.

Detailed instructions for meteorological observations, for making, preparing, and packing collections of natural history, hints for ethnological research, and blanks for recording vocabularies, accompany the parcel transmitted.

With many thanks for your courtesy in asking the co-operation of the Smithsonian Institution, I remain,

Yours respectfully,

JOSEPH HENRY.
Secretary Smithsonian Institution.

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I. Meteorology.

1. Keep a journal of the weather at regular intervals of time, noting—

(1.) The direction of the wind.
(2.) Face of the sky as to cloudiness.
(3.) Direction of motion of upper and lower clouds.
(4.) Rain, snow, hail, fogs, &c.
(5.) Temperature of air and water.
(6.) Pressure of air.
(7.) Moisture by wet and dry bulb thermometers.

2. In recording any observation give the exact time, latitude and longitude of ship, and name of the observer.

3. When but two observations are made in the course of the day the hours should be 8 a. m. and 8 p. m.; when three observations, at 7 a. m., 2 and 9 p. m. If the number of observers is sufficient a record of temperature and pressure may be made hourly or bi-hourly for a week together when the vessel is stationary, in order to ascertain the daily variations. Unusual phenomena should be recorded at the time of occurrence.

4. The indications of a maximum and also of a minimum thermometer should be recorded at least once a day.

5. The observations with the wet and dry bulb thermometer are very important and should be carefully made at least three times a day in a place freely exposed to the air. The difference between the wet and dry bulb will be less in warm weather when the air is nearly saturated with vapor, and also in cold weather when it contains very little moisture. The wet bulb, however, should always be the lower; but in some cases during a low falling temperature the water absorbed by the covering of the wet bulb may become frozen, and while evolving its latent heat will prevent as a rapid a descent of the mercury as in the case of the dry bulb, which may be at the time exposed to a current of cold air. If the observation, however, be continued sufficiently long and the temperature remain steady the covered bulb will finally indicate the lower temperature though it be covered with a coating of ice.

6. The force of solar radiation should be observed every day at noon, with a blackened bulb thermometer, surrounded by a vacuum. enclosed in an outer glass envelope. In default of this

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apparatus a common thermometer may be used, the bulb of which is surrounded by floculent black wool.

7. Note every appearance of shooting stars and fire balls; give their direction of motion among the stars, starting and ending points; give the intensity of light of fire ball as compared with that of day; the size compared with that of the moon. If an explosion is observed listen for sound for perhaps two or three minutes. Make special observations for shooting stars on several nights about the 12th or 13th of November. Observations should be kept up for several nights on, before and after these epochs for the purpose of comparison. Other periods less marked may be noted, namely: April, from 23d to 24th; June, from 15th to 20th; October 18th; December 6th and 7th; January 2d.

8. The temperature of the surface of the water should be frequently taken, first to ascertain if there are any variations from day to day, when the vessel is at rest in the same place, and, second, to determine the variations from place to place when the vessel is in motion; in certain cases, such as entering a warm stream the change may be very sudden.

For determining the surface temperature, the water may be drawn in a bucket, care being taken to let it remain long enough overboard to obtain the temperature of the water. If a thermometer be let down into the water to obtain the surface, or deep sea temperature, its bulb should be surrounded with several coatings of cloth, in order that the temperature may remain long enough stationary to admit of its being read on deck without sensible change. Care, however, must be taken that the thermometer remain in the water sufficiently long to acquire the temperature of the latter.

9. Frequent observations should be made to ascertain the direction of currents by a comparison of dead reckoning with astronomical observations, and, to afford data for subsequent determinations, bottles containing a sheet of paper, giving the latitude, longitude, and time, with directions as to where the paper is to be sent by the finder, should be frequently thrown overboard. The bottles should be of transparent glass in order that the white paper may be seen at a distance. The ordinary black bottle is so near the color of the sea as to escape notice unless cast on the shore by a wave.

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10. The color of the water should be noted as this may be important in connexion with currents, shoals,. &c. Extensive tracts of green water have been reported, lying at some distance off the coast and extending as high up as Queen Charlotte Islands. The existence or non-existence of these should be determined as far as possible.

11. After a storm, measure the height of the waves by ascending the shrouds to an elevation which shall just bring the line of vision of the distant horizon over the crest of the wave, while the ship is in the hollow. Note time when high waves are observed without a storm, and also their direction; they give indications of a storm having occurred at a distance.

12. Note the appearance of the sky over stream like that of the Gulf when at a distance from them on either side, also, whether water-spouts occur more frequently within their limits than in other parts of the ocean. Make frequent observations of the surface temperature on approaching and leaving the streams, also their width.

13. Carefully note the time and place of entering and leaving the northeast trade-winds.

14. The direction of the motion of the highest fleecy clouds is important, and should be entered whenever they are seen. The direction of the lower clouds, as well as the surface wind, should be noted.

15. In recording fogs, when they are at a short distance, give the height of the upper and lower surface when not resting on the water, and be careful to note the temperature of the air and water before and after entering. In sailing near the land observe the condition of light-houses in regard to fogs—whether the top or bottom of the tower first becomes visible, as seen across the fog.

16. Hazy weather is sometimes produced by what is called dry fogs, which may be due to volcanic dust or other solid substance in powder.. If anything of this kind be deposited on deck, specimens should be carefully collected and preserved.

17. Note the points along the western coast of Central America where the trade-wind from the east blows strongly across the Isthmus to the Pacific as well as the direction and intensity of this wind.

18. In the case of thunder-storms note the direction from

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which the storm comes, the time of its passage across the ship, and, by subsequent angular observations, determine the length and breadth of the meteor, as measured on the surface of the earth, and also its altitude. The whole disturbance of the atmosphere, in case of a thunder-storm, is frequently confined to a space of three or four miles in one direction, and from two to three miles in the other.

The change of the wind should be noted during the approach, passage, and end of the storm, and also the character of the lightning, whether sheet, zig-zag, or ramified, and particularly whether it is in the form of a globe or ball of fire. Note also the character of the thunder, whether loud, faint, a sudden explosion, or a continued reverberation. If the ship should be struck all the particulars of the effects produced should be carefully described.

During the passage of the electrical discharge along the mast of a ship the natural electricity of all the other parts of the vessel will be disturbed, and in this way effects may be produced in the cabin not immediately referable to the primary discharge.

It is stated that thunder storms are not observed on the ocean beyond a certain latitude, and, also, on land, along the north-western coast of America, there are places where they never, or very rarely, occur. Facts in regard to this point are interesting.

19. In case of the occurrence of a tornado or cyclone, every change in the direction and intensity of the wind should be noted, the barometer and thermometer constantly watched, and their indications given, the appearance of the sky, and particularly the motion of tho lower and upper clouds, as compared with the surface wind. If the centre of the storm be passed through, a lull will probably be observed coinciding, perhaps, with the lowest altitude of the barometer, and followed by a change in the direction of the wind. If the vessel be in north latitude, and the storm be that of a true cyclone, the direction of its centre may be determined by facing the wind and extending the arms. The right hand will then extend to the centre of the storm.

Copies of the logs of all vessels which are subsequently met with that have encountered the same storm should be collected.

20. In observing the Aurora, note whether an arch be formed.

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the bearing of its apex, give its altitude from time to time, and any changes that may take place in it, and whether a dark cloud exists in the segment beneath, while the other parts of the heavens are unclouded. When Auroral beams appear they frequently move laterally along the arch. Note whether this motion is to the east or to the west. This observation is important in ascertaining whether the electrical discharge, to which the Aurora is undoubtedly due, be to or from the earth.

When the beams of the Aurora shoot up toward the zenith, note whether any mistiness in the atmosphere becomes instantaneously perceptible, and, whether this continues or soon disappears. Note whether the beams in any case are visible between a distant mountain, or a cloud, and the observer, and whether sounds accompany the meteor.

21. In going up the western coast it should be recollected that the magnetic needle has a large easterly variation increasing as we advance northward, care should therefore be taken to state, whether the register of the wind, arch of the Aurora, &c., is made in reference to the magnetic or true north, and to which the accounts of the directions of the wind you may obtain from others relates.

22. Note the appearance of water-spouts and the condition of the air as to temperature and moisture under which they occur; the direction of their motion, and whether they appear singly or in numbers. Observe whether the top spreads out with currents of air moving from it in every direction as if from a centre; and if the ship is near observe the effect on the barometer and whether the direction of the wind is then toward the spout.

23. Regular observations should be made on land when opportunities occur on all the objects mentioned in paragraph one. Enquiry should be made as to the occurrence of thunder storms; appearance of the aurora; amount of rain and snow; early and late frosts; as to whether cracks are produced during very cold weather in the earth by the shrinking of the surface; thickness of the ice in harbors; time of planting and reaping; of flowering of plants; leafing, &c., of trees; kinds and quality of grain, vegetables, &c., which are grown.

24. Observations should be made of the temperature of the ground at the depth of an inch, a foot, and a yard, the depth to

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which frost extends, and in higher latitudes the depth to which the thawing reaches.

25. Observations on clear nights should be made as to radiation from the earth and the deposition of dew on glass, wood, wool, &c.

II. Ethnology.

1. As language affords one of the readiest, and perhaps the most certain mode of tracing affinity among the races of men, it is particularly desired to collect accurate vocabularies of a sufficient number of words in common use to make at any rate approximate comparisons. Fuller ones and grammars or partial grammatical forms should be obtained of course, when practicable, but as this is not likely to be the case during so short a voyage, such results as are attainable should be looked for. It is probable that Prince Maksoutoff in accordance with the example of his predecessors, Admirals Woewodsky and Furuhjelm, will aid in this by distributing the blanks furnished for the purpose to agents at the various ports of the Russo-American Fur Company. The most important tribes remaining are those extending from Copper river along the coast to Cape Fairweather, especially those known as Ugalentses and Galshanes. New vocabularies are however wanted of all the Eskimo tribes, including the Namollos of the Asiatic side of Behring Strait; of the Aleutians, the Kenaiens, and the Koloshians, in their various languages and dialects.

2. The collection of articles of indigenous manufacture or employment will, of course, form an object of particular interest, and should extend even to the most common and trivial. Drawings, or better still, photographs, should be made of dwellings, tombs, &c. Should a photographer accompany the expedition, it is most important that portraits of good size be taken of individuals of as many tribes as possible, less with the view of displaying their dress and ornaments than their features, form of the head, &c. A collection of skulls as far as possible, representing each tribe, should be made and in large numbers of specimens, particularly of the Eskimo nations, great care being taken to give locality and race.

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III. Natural History.

1. It will of course be an object on the part of the Commission of the Treasury Department to illustrate the capabilities of Russian America in reference to its furs, fisheries, and forests, as well as its mineralogical and geological products. Understanding that the Coast Survey will take charge of matters pertaining to geological observations, we would call especial attention to the importance of securing full collections of all the animals known in the Russian American fur trade. Of these the most important is the sea otter, all the different recognized varieties of which should be procured, and of different ages, with, if possible, one or more skeletons. The black fox of the islands should be obtained for comparison with that of the mainland already in possession of the Smithsonian Institution. The different kinds of seals, especially the fur seal, of different ages, including very young and very old, and if possible a walrus of medium size should be secured; good specimens of the Rocky Mountain white goat with black horns, and of the Big-horn if it occurs, the bears, etc., will all be of interest and value. These skins should be obtained unmutilated, and having the entire exterior preserved—head, with lips and ears, feet, tail, etc., that they may be mounted and set up. Skulls and if possible skeletons of all these animals will be desirable. Any species of mammals however will be of interest to the naturalist, including the mice, moles, bats, etc.

2. Among animals of economical value the different species of cetaceans, whales, porpoises, black fish, grampus, etc., are of course very prominent. Of the smaller, it is very desirable to have skins for stuffing; of any the skulls with the entire skeleton, if procurable will be useful, and especially so if a sketch of the animal in the flesh can be taken showing shape, proportions, and distribution of color between the upper and under surfaces. Very little is known of even the whales of the North Pacific, as to their true relationship with those of other parts of the world, and something of importance may be done in this connection by the Commission.

3. Among the Aleutian Islands is a great variety of sea-fowl, more or less unknown to the naturalist, and which will be of much interest. The most desirable of them are the small sea-

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pigeons, dovekies, etc., some not larger than very young chickens. All the different kinds of these should be sought for and secured, as also the different kinds of cormorants, gulls, ducks and geese, and the land birds of the islands. Good collections of birds made at Sitka and in possession of the Smithsonian Institution render it less necessary to prosecute careful research into the ornithology of that Island; but Kodiak, Aonalaska, and the other Aleutians are almost entirely unknown in this connection and any collections will be of value.

4. Whenever the occasion offers, eggs of any species of bird breeding in Russian America should be secured, and the parent collected for identification.

5. Of the fishes it is desirable to secure good skins of large specimens of all the different food-species, as cod, halibut, salmon, sturgeon, etc., in order that they may be properly stuffed and placed on exhibition; the smaller kinds should also be represented as far as possible. The few species of reptiles occurring in the country should be carefully collected. Any specimens of shells, crabs, radiates, and other marine animals as well as the different orders of insects, will be of interest to the naturalist.

6. Specimens of the timber trees of the country should be secured, and sections with the bark on should be made to show the character of the wood. These should however always be accompanied by specimens of the foliage and fruit of the same tree to indicate its true botanical character together with an account of the extent and magnitude of the forest. Specimens of any other plants of known economical value should also be obtained. To the botanist, complete series of all plants of the different localities will be of much interest.

7. Full collections should be made of the rocks and minerals of the country at the different stopping points, as well as of any fossil remains that may be found to occur. Notes should accompany these specimens showing their relationship to each other and the country itself, and illustrated by diagrams indicating the number, inclination, and relative thickness of any strata that may be observed.

8. If the services of a competent naturalist can be procured in San Francisco, it will be of much importance and tend to add to the value of the information relative to the economical natural history of the country. An allowance too, will, probably have

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to be made to meet expense of purchasing such furs as cannot otherwise be obtained, as sea otters, etc., as it is of great importance to be able to exhibit them to Congress. The magazines of the Russian American Company at Sitka, will probably contain nearly every kind of animal known in the fur trade.

9. In making any collections as suggested, care should be taken to attach a label or otherwise marking each specimen, so as to show the exact date and locality. Much of the value of these objects will be lost, unless such facts accompany them. Especial attention too, should be paid to their preparation and packing, so that they may not be injured or destroyed on the way back. If possible the skins of birds and animals should be sent home even before the return of the expedition in order that time may be allowed to have them properly prepared and mounted for exhibition. Any packages addressed to the Smithsonian Institution, care of the Pacific M. S. S. Co., San Francisco, will be forwarded free of expense.

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CIRCULAR

RELATING TO

COLLECTIONS IN ARCHÆOLOGY AND ETHNOLOGY.

THE Smithsonian Institution is now engaged in arranging the specimens in its collection which illustrate the history of the native tribes that have inhabited the continent of America from the earliest known period to the present time. It proposes to give to this department of science especial prominence, and respectfully invites the co-operation of its correspondents, and of the friends of science generally, in gathering together in the national museum under its charge, as full a series of the objects in question as it may be possible to collect at the present day.

In a pamphlet published by the Institution (a copy of which will be sent to any applicant) will be found detailed instructions for researches in the ethnology and philology of the American races. Among the objects there indicated as especially desired, may be mentioned the following:—

1st. Human crania of both sexes, and in as large number as practicable; the name of the tribe and sex when known, and of the locality and collector to be legibly written on the bone.

2d. Photographic portraits of both sexes of the different tribes.

3d. Remains of tribes now extinct: among these may be mentioned the axes, arrow-heads, pipes, pestles, and other implements of stone found in the superficial soil; pottery, either in fragments or entire, of earthenware, soapstone, or other material; images, idols, and, in fact, whatever has been in any way fashioned by the hand of the aboriginal man. The locality of each object

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should, as far as known, be indicated, as also the name of the tribe formerly inhabiting the region where found.

4th. Illustrations of the ethnology of living tribes: under this head may be included the various articles of dress used by each sex, and at different seasons of the year; pipes; implements of fishing and hunting, of war, agriculture and manufacture; domestic utensils (especially those used in grinding corn, etc.), models of boats, lodges, tents, sleds, etc.; trapping of horses, dogs, and reindeer; mats, baskets, etc. All such objects should be accompanied by accurate information, when procurable, of the tribe, locality, date, native name, and uses of the same, as well as name of collector.

While full series of objects from different localities are desirable, single specimens will be very acceptable as tending to fill up gaps in collections already made. Duplicate specimens in larger or smaller numbers will be also useful to make up series for exchange with ethnological museums at home and abroad.

Due acknowledgment will, in all cases, be made for contributions of the kind asked for, on the labels of the specimens, in the annual reports of the Institution, etc., as well as in the descriptive memoirs which may be based upon the same. Return will also be made in the annual reports of the Institution, and other of its publications of interest to the donor, while in some cases it may be possible to furnish specimens of natural history, as shells etc. in exchange.

JOSEPH HENRY,
Secretary S. I.

SMITHSONIAN INSTITUTION,
WASHINGTON, January 15, 1867.

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CIRCULAR TO ENTOMOLOGISTS.

THE Smithsonian Institution proposes to publish a series of descriptive monographs upon the different orders of North American Insects, to follow its series of catalogues of known species.

In accordance with this plan, Dr. J. L. Leconte, of Philadelphia, is engaged in preparing an elementary work on the *Coleoptera*, to embrace descriptions of families, and an analysis of the genera. Dr. Morris, of Baltimore, has nearly completed a compilation of all published descriptions of the Diurnal *Lepidoptera*, to follow his catalogue of the species, now nearly through the press.

Dr. Henry Hagen, of Königsberg, has undertaken a work on the *Neuroptera;* Dr. Loew, of Meseritz, assisted by Baron Ostensacken, of St. Petersburg, is preparing one on the *Diptera*, and Mr. H. de Saussure, of Geneva, one on the *Hymenoptera*. Each of these will embrace descriptions of all the species before known, besides several hundred new ones.

The works on the *Diptera*, *Neuroptera*, and *Hymenoptera*, will probably be issued within the year, and as it is very desirable to have these as complete as possible on their first appearance, the Smithsonian Institution would respectfully request full series as can be furnished of specimens of these three orders, to be transmitted to the authors mentioned. They should, as far as practicable, be pinned, and inclosed in separate boxes, carefully packed, and endorsed with the names of the order, locality, and collector, so that they can be forwarded without opening to their destination.

The Institution will endeavor to secure, if desired, the safe return of any specimens that may be sent, although it would request that several duplicates of each species be supplied, in

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order that a type series may be retained by the authors of the reports for themselves, and another for the Smithsonian Museum. If *uniques* are sent, particular instructions should be given as to the disposition to be made of them.

Specimens which can now be furnished should be sent at once to the Smithsonian Institution, well packed, through the Adams' Express Co., and a subsequent transmission be made in June, or early in July, so as to embrace the collections of the coming spring.

Contributors of materials will be supplied with any Smithsonian publications respecting the several orders, for which specimens have been furnished.

It is hoped that collectors will properly appreciate the importance of the object in view, and respond liberally to the foregoing request.

JOSEPH HENRY,
Secretary S. I.

SMITHSONIAN INSTITUTION, WASHINGTON, *April* 2, 1860.

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CIRCULAR

RELATIVE TO

COLLECTIONS OF BIRDS FROM MIDDLE AND SOUTH AMERICA.

THE Smithsonian Institution is desirous of obtaining a complete collection of the birds of Mexico, Central and South America, and the West Indies, to be used in the preparation of a work on the subject, and towards this end respectfully invites the co-operation of the Diplomatic and Naval officers of the United States, and of the friends of science generally.

As a chief object in making this collection is to determine with accuracy the region inhabited by the different species of birds, specimens of all kinds from any locality are desired, and especially the more common and familiar ones, as being the most characteristic. These, as far as practicable, should include illustrations of the different sexes, ages, and changes of plumage of the various species.

The species to which attention should first be directed are the smaller land birds, such as sparrows, wrens, thrushes, warblers, creepers, fly-catchers, humming-birds, woodpeckers, cuckoos, parrots, swallows, etc., and next to them the hawks and owls. The large water birds, as the ducks, geese, great herons, etc., are of less immediate importance, as being better known. The gallinaceous birds, as quails, tinamous, penelopes, curassows, etc., are especially wanted.

Complete collections of the birds inhabiting the different islands of the West Indies are particularly desired.

If time and opportunity do not admit of collecting an extensive series of birds of any locality, the Institution will be pleased

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to receive even single specimens, which often furnish hints of much value.

While specimens in any condition of preservation will be thankfully received, their value for the purposes in view will be greatly enhanced by their being well prepared and by being accompanied by accurate indications of the date and place of collection, the sex, and the color of the iris, bill and feet, as well as the length of the bird (from point of bill to end of tail) before being skinned. These data should be written upon a label tied to a leg of the specimen.

Eggs of birds, accompanied by the skin of a parent for verification, are also very desirable.

Full directions for collecting and preserving birds and other specimens of natural history have been published by the Institution, and will be furnished on application. If skins cannot be readily prepared, birds may be preserved by throwing them entire into rum or other spirits.

The Institution has no funds at its command for the purchase of specimens, but it will be happy to make all the return in its power for contributions, in copies of its different publications, especially those based on the specimens received. Full credit will, in all cases, be given for any donations, in the published works of the Institution and on the labels of the specimens. If desired, however, specimens of birds or other animals of North America, will be sent in return.

Collections sent by sea to the Smithsonian Institution, care of the Collector of the Port of New York, will reach their intended destination. The Agents of the Panama R. R. Co., and of the Pacific Mail Steamship Co., on the Isthmus, or on the western coast of America, will also receive and forward specimens. The Diplomatic and Naval officers of the United States have always been found ready to co-operate in forwarding collections to the Institution.

Due notice should always be given to the Institution of the date and channel of forwarding specimens.

JOSEPH HENRY,
Secretary, S. I.

SMITHSONIAN INSTITUTION, WASHINGTON, U. S. A., *December* 10, 1863.

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SMITHSONIAN MISCELLANEOUS COLLECTIONS.
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SMITHSONIAN

MUSEUM MISCELLANEA.

WASHINGTON:
SMITHSONIAN INSTITUTION.
1862.

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OUISIANA.	La.	La.	La.	La.	La.	La.	La.	La.	La.	La.	La.	La.	La.	La.	La.	La.	La.	La.
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Maine.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.
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	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.	Me.
Maryland.	Md.	Md.	Md.	Md.	Md.	Md.	Md.	Md.	Md.	Md.	Md.	Md.	Md.	Md.	Md.	Md.	Md.	Md.	Md.
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Massachusetts.	Mass.	Mass.	Mass.	Mass.	Mass.	Mass.	Mass.	Mass.	Mass.	Mass.	Mass.	Mass.	Mass.	Mass.	Mass.	Mass.	Mass.	Mass.	Mass.
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Minnesota.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.
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Mississippi.	Miss.	Miss.	Miss.	Miss.	Miss.	Miss.	Miss.	Miss.	Miss.	Miss.	Miss.	Miss.	Miss.	Miss.	Miss.	Miss.	Miss.	Miss.	Miss.
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Missouri.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.
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Nebraska.	Neb.	Neb.	Neb.	Neb.	Neb.	Neb.	Neb.	Neb.	Neb.	Neb.	Neb.	Neb.	Neb.	Neb.	Neb.	Neb.	Neb.	Neb.	Neb.
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New Jersey.	N. J.	N. J.	N. J.	N. J.	N. J.	N. J.	N. J.	N. J.	N. J.	N. J.	N. J.	N. J.	N. J.	N. J.	N. J.	N. J.	N. J.	N. J.	N. J.
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New Mexico.	N. M.	N. M.	N. M.	N. M.	N. M.	N. M.	N. M.	N. M.	N. M.	N. M.	N. M.	N. M.	N. M.	N. M.	N. M.	N. M.	N. M.	N. M.	N. M.
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New York.	N. Y.	N. Y.	N. Y.	N. Y.	N. Y.	N. Y.	N. Y.	N. Y.	N. Y.	N. Y.	N. Y.	N. Y.	N. Y.	N. Y.	N. Y.	N. Y.	N. Y.	N. Y.	N. Y.
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North Carolina.	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.	N. C.
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Nova Scotia.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.
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Pennsylvania.	Penn.	Penn.	Penn.	Penn.	Penn.	Penn.	Penn.	Penn.	Penn.	Penn.	Penn.	Penn.	Penn.	Penn.	Penn.	Penn.	Penn.	Penn.	Penn.
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Rhode Island.	R. I.	R. I.	R. I.	R. I.	R. I.	R. I.	R. I.	R. I.	R. I.	R. I.	R. I.	R. I.	R. I.	R. I.	R. I.	R. I.	R. I.	R. I.	R. I.
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Sonora.	Son.	Son.	Son.	Son.	Son.	Son.	Son.	Son.	Son.	Son.	Son.	Son.	Son.	Son.	Son.	Son.	Son.	Son.	Son.
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South Carolina.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.
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Virginia.	Va.	Va.	Va.	Va.	Va.	Va.	Va.	Va.	Va.	Va.	Va.	Va.	Va.	Va.	Va.	Va.	Va.	Va.	Va.
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Washington.	W. T.	W. T.	W. T.	W. T.	W. T.	W. T.	W. T.	W. T.	W. T.	W. T.	W. T.	W. T.	W. T.	W. T.	W. T.	W. T.	W. T.	W. T.	W. T.
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Wisconsin.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.
	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.
	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.	Wisc.
Russian America.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.
	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.
	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.	R. A.
Hudson's Bay Ter.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.
	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.
	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.	H. B. T.
Vancouver.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.
	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.
	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.	Van.
British Columbia.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.
	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.
	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.	B. Col.

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1	32	63	94	125	156	187	218	249	280	311	342	373	404
2	33	64	95	126	157	188	219	250	281	312	343	374	405
3	34	65	96	127	158	189	220	251	282	313	344	375	406
4	35	66	97	128	159	190	221	252	283	314	345	376	407
5	36	67	98	129	160	191	222	253	284	315	346	377	408
6	37	68	99	130	161	192	223	254	285	316	347	378	409
7	38	69	100	131	162	193	224	255	286	317	348	379	410
8	39	70	101	132	163	194	225	256	287	318	349	380	411
9	40	71	102	133	164	195	226	257	288	319	350	381	412
10	41	72	103	134	165	196	227	258	289	320	351	382	413
11	42	73	104	135	166	197	228	259	290	321	352	383	414
12	43	74	105	136	167	198	229	260	291	322	353	384	415
13	44	75	106	137	168	199	230	261	292	323	354	385	416
14	45	76	107	138	169	200	231	262	293	324	355	386	417
15	46	77	108	139	170	201	232	263	294	325	356	387	418
16	47	78	109	140	171	202	233	264	295	326	357	388	419
17	48	79	110	141	172	203	234	265	296	327	358	389	420
18	49	80	111	142	173	204	235	266	297	328	359	390	421
19	50	81	112	143	174	205	236	267	298	329	360	391	422
20	51	82	113	144	175	206	237	268	299	330	361	392	423
21	52	83	114	145	176	207	238	269	300	331	362	393	424
22	53	84	115	146	177	208	239	270	301	332	363	394	425
23	54	85	116	147	178	209	240	271	302	333	364	395	426
24	55	86	117	148	179	210	241	272	303	334	365	396	427
25	56	87	118	140	180	211	242	273	304	335	366	397	428
26	57	88	119	150	181	212	243	274	305	336	367	398	429
27	58	89	120	151	182	213	244	275	306	337	368	399	430
28	59	90	121	152	183	214	245	276	307	338	369	400	431
29	60	91	122	153	184	215	246	277	308	339	370	401	432
30	61	92	123	154	185	216	247	278	309	340	371	402	433
31	62	93	124	155	186	217	248	279	310	341	372	403	434

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435	466	497	528	559	590	621	652	683	714	745	776	807	838
436	467	498	529	560	591	622	653	684	715	746	777	808	839
437	468	499	530	561	592	623	654	685	716	747	778	809	840
438	469	500	531	562	593	624	655	686	717	748	779	810	841
439	470	501	532	563	594	625	656	687	718	749	780	811	842
440	471	502	533	564	595	626	657	688	719	750	781	812	843
441	472	503	534	565	596	627	658	689	720	751	782	813	844
442	473	504	535	566	597	628	659	690	721	752	783	814	845
443	474	505	536	567	598	629	660	691	722	753	784	815	846
444	475	506	537	568	599	630	661	692	723	754	785	816	847
445	476	507	538	569	600	631	662	693	724	755	786	817	848
446	477	508	539	570	601	632	663	694	725	756	787	818	849
447	478	509	540	571	602	633	664	695	726	757	788	819	850
448	479	510	541	572	603	634	665	696	727	758	789	820	851
449	480	511	542	573	604	635	666	697	728	759	790	821	852
450	481	512	543	574	605	636	667	698	729	760	791	822	853
451	482	513	544	575	606	637	668	699	730	761	792	823	854
452	483	514	545	576	607	638	669	700	731	762	793	824	855
453	484	515	546	577	608	639	670	701	732	763	794	825	856
454	485	516	547	578	609	640	671	702	733	764	795	826	857
455	486	517	548	579	610	641	672	703	734	765	796	827	858
456	487	518	549	580	611	642	673	704	735	766	797	828	859
457	488	519	550	581	612	643	674	705	736	767	798	829	860
458	489	520	551	582	613	644	675	706	737	768	799	830	861
459	490	521	552	583	614	645	676	707	738	769	800	831	862
460	491	522	553	584	615	646	677	708	739	770	801	832	863
461	492	523	554	585	616	647	678	709	740	771	802	833	864
462	493	524	555	586	617	648	679	710	741	772	803	834	865
463	494	525	556	587	618	649	680	711	742	773	804	835	866
464	495	526	557	588	619	650	681	712	743	774	805	836	867
465	496	527	558	589	620	651	682	713	744	775	806	837	868

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869	900	931	962	993	1024	1055	1086	1117	1148	1179	1210	1241
870	901	932	963	994	1025	1056	1087	1118	1149	1180	1211	1242
871	902	933	964	995	1026	1057	1088	1119	1150	1181	1212	1243
872	903	934	965	996	1027	1058	1089	1120	1151	1182	1213	1244
873	904	935	966	997	1028	1059	1090	1121	1152	1183	1214	1245
874	905	936	967	998	1029	1060	1091	1122	1153	1184	1215	1246
875	906	937	968	999	1030	1061	1092	1123	1154	1485	1216	1247
876	907	938	969	1000	1031	1662	1093	1124	1155	1186	1217	1248
877	908	939	970	1001	1032	1063	1094	1125	1156	1187	1218	1249
878	909	940	971	1002	1033	1064	1095	1126	1157	1188	1219	1250
879	910	241	972	1003	1034	1065	1096	1127	1158	1189	1220	1251
880	911	942	973	1004	1035	1066	1097	1128	1159	1190	1221	1252
881	912	943	974	1005	1036	1067	1098	1129	1160	1191	1222	1253
882	913	944	975	1006	1037	1068	1099	1130	1161	1192	1223	1254
883	914	945	976	1007	1038	1069	1100	1131	1162	1193	1224	1255
884	915	946	977	1008	1039	1070	1101	1132	1163	1194	1225	1256
885	916	947	978	1009	1040	1071	1102	1133	1164	1195	1226	1257
886	917	948	979	1010	1041	1072	1103	1134	1165	1196	1227	1258
887	918	949	980	1011	1042	1073	1104	1135	1166	1197	1228	1259
888	919	950	981	1012	1043	1074	1105	1136	1167	1198	1229	1260
889	920	951	982	1013	1044	1075	1106	1137	1168	1199	1230	1261
890	921	952	983	1014	1045	1076	1107	1138	1169	1200	1231	1262
891	922	953	984	1015	1046	1077	1108	1139	1170	1201	1232	1263
892	923	954	985	1016	1047	1078	1109	1140	1171	1202	1233	1264
893	924	955	986	1017	1048	1079	1110	1141	1172	1203	1234	1265
894	925	956	987	1018	1049	1080	1111	1142	1173	1204	1235	1266
895	926	957	988	1019	1050	1081	1112	1143	1174	1205	1236	1267
896	927	958	989	1020	1051	1082	1113	1144	1175	1206	1237	1268
897	828	959	990	1021	1052	1083	1114	1145	1176	1207	1238	1269
898	929	960	991	1022	1053	1084	1115	1146	1177	1208	1239	1270
899	930	961	992	1023	1054	1085	1116	1147	1178	1209	1240	1271

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1272	1303	1334	1365	1396	1427	1458	1489	1520	1551	1582	1613
1273	1304	1335	1366	1397	1428	1459	1490	1521	1552	1583	1614
1274	1305	1336	1367	1398	1429	1460	1491	1522	1553	1584	1615
1275	1306	1337	1368	1399	1430	1461	1492	1523	1554	1585	1616
1276	1307	1338	1369	1400	1431	1462	1493	1524	1555	1586	1617
1277	1308	1339	1370	1401	1432	1463	1494	1525	1556	1587	1618
1278	1309	1340	1371	1402	1433	1464	1495	1526	1557	1588	1619
1279	1310	1341	1372	1403	1434	1465	1496	1527	1558	1589	1620
1280	1311	1342	1373	1404	1435	1466	1497	1528	1559	1590	1621
1281	1312	1343	1374	1405	1436	1467	1498	1529	1560	1591	1622
1282	1313	1344	1375	1406	1437	1468	1499	1530	1561	1592	1623
1283	1314	1345	1376	1407	1438	1469	1500	1531	1562	1593	1624
1284	1315	1346	1377	1408	1439	1470	1501	1532	1563	1594	1625
1285	1316	1347	1378	1409	1440	1471	1502	1533	1564	1595	1626
1286	1317	1348	1379	1410	1441	1472	1503	1534	1565	1596	1627
1287	1318	1349	1380	1411	1442	1473	1504	1535	1566	1597	1628
1288	1319	1350	1381	1412	1443	1474	1505	1536	1567	1598	1629
1289	1320	1351	1382	1413	1444	1475	1506	1537	1568	1599	1630
1290	1321	1352	1383	1414	1445	1476	1507	1538	1569	1600	1631
1291	1322	1353	1384	1415	1446	1477	1508	1539	1570	1601	1632
1292	1323	1354	1385	1416	1447	1478	1509	1540	1571	1602	1633
1293	1324	1355	1386	1417	1448	1479	1510	1541	1572	1603	1634
1294	1325	1356	1387	1418	1449	1480	1511	1542	1573	1604	1635
1295	1326	1357	1388	1419	1450	1481	1512	1543	1574	1605	1636
1296	1327	1358	1389	1420	1451	1482	1513	1544	1575	1606	1637
1297	1328	1359	1390	1421	1452	1483	1514	1545	1576	1607	1638
1298	1329	1360	1391	1422	1453	1484	1515	1546	1577	1608	1639
1299	1330	1361	1392	1423	1454	1485	1516	1547	1578	1609	1640
1300	1331	1362	1393	1424	1455	1486	1517	1548	1579	1610	1641
1301	1332	1363	1394	1425	1456	1487	1518	1549	1580	1611	1642
1302	1333	1364	1395	1426	1457	1488	1519	1550	1581	1612	1643

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1	42	83	124	165	206	247	288	329	370	
2	43	84	125	166	207	248	289	330	371	4
3	44	85	126	167	208	249	290	331	372	4
4	45	86	127	168	209	250	291	332	373	4
5	46	87	128	169	210	251	292	333	374	4
6	47	88	129	170	211	252	293	334	375	4
7	48	89	130	171	212	253	294	335	376	4
8	49	90	131	172	213	254	295	336	377	4
9	50	91	132	173	214	255	296	337	378	4
0	51	92	133	174	215	256	297	338	379	4
1	52	93	134	175	216	257	298	339	380	4
2	53	94	135	176	217	258	299	340	381	4
3	54	95	136	177	218	259	300	341	382	4
4	55	96	137	178	219	260	301	342	383	4
5	56	97	138	179	220	261	302	343	384	4
6	57	98	139	180	221	262	303	344	385	4
7	58	99	140	181	222	263	304	345	386	4
8	59	100	141	182	223	264	305	346	387	4
9	60	101	142	183	224	265	306	347	388	4
0	61	102	143	184	225	266	307	348	389	4
1	62	103	144	185	226	267	308	349	390	4
2	63	104	145	186	227	268	309	350	391	4
3	64	105	146	187	228	269	310	351	392	4
4	65	106	147	188	229	270	311	352	393	4
5	66	107	148	189	230	271	312	353	394	4
6	67	108	149	190	231	272	313	354	395	4
7	68	109	150	191	232	273	314	355	396	4
8	69	110	151	192	233	274	315	356	397	4
9	70	111	152	193	234	275	316	357	398	4
0	71	112	153	194	235	276	317	358	399	4
	72	113	154	195	236	277	318	359	400	4
	73	114	155	196	237	278	319	360	401	4
	74	115	156	197	238	279	320	361	402	4
	75	116	157	198	239	280	321	362	403	4
	76	117	158	199	240	281	322	363	404	4
	77	118	159	200	241	282	323	364	405	4
	78	119	160	201	242	283	324	365	406	4
	79	120	161	202	243	284	325	366	407	4
	80	121	162	203	244	285	326	367	408	4
	81	122	163	204	245	286	327	368	409	4
	82	123	164	205	246	287	328	369	410	4

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452	493	534	575	616	657	698	739	780	82
453	494	535	576	617	658	699	740	781	822
454	495	536	577	618	659	700	741	782	823
455	496	537	578	619	660	701	742	783	824
456	497	538	579	620	661	702	743	784	825
457	498	539	580	621	662	703	744	785	826
458	499	540	581	622	663	704	745	786	827
459	500	541	582	623	664	705	746	787	828
460	501	542	583	624	665	706	747	788	829
461	502	543	584	625	666	707	748	789	830
462	503	544	585	626	667	708	749	790	831
463	504	545	586	627	668	709	750	791	832
464	505	546	587	628	669	710	751	792	833
465	506	547	588	629	670	711	752	793	834
466	507	548	589	630	671	712	753	794	835
467	508	549	590	631	672	713	754	795	836
468	509	550	591	632	673	714	755	796	837
469	510	551	592	633	674	715	756	797	838
470	511	552	593	634	675	716	757	798	839
471	512	553	594	635	676	717	758	799	840
472	513	554	595	636	677	718	759	800	841
473	514	555	596	637	678	719	760	801	842
474	515	556	597	638	679	720	761	802	843
475	516	557	598	639	680	721	762	803	844
476	517	558	599	640	681	722	763	804	845
477	518	559	600	641	682	723	764	805	846
478	519	560	601	642	683	724	765	806	847
479	520	561	602	643	684	725	766	807	848
480	521	562	603	644	685	726	767	808	849
481	522	563	604	645	686	727	768	809	850
482	523	564	605	646	687	728	769	810	851
483	524	565	606	647	688	729	770	811	852
484	525	566	607	648	689	730	771	812	853
485	526	567	608	649	690	731	772	813	854
486	527	568	609	650	691	732	773	814	855
487	528	569	610	651	692	733	774	815	856
488	529	570	611	652	693	734	775	816	857
489	530	571	612	653	694	735	776	817	858
490	531	572	613	654	695	736	777	818	859
491	532	573	614	655	696	737	778	819	860
492	533	574	615	656	697	738	779	820	861

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2	903	944	985	1026	1067	1108	1149	1190
3	904	945	986	1027	1068	1109	1150	1191
4	905	946	987	1028	1069	1110	1151	1192
5	906	947	988	1029	1070	1111	1152	1193
6	907	948	989	1030	1071	1112	1153	1194
7	908	949	990	1031	1072	1113	1154	1195
8	909	950	991	1032	1073	1114	1155	1196
9	910	951	992	1033	1074	1115	1156	1197
0	911	952	993	1034	1075	1116	1157	1198
1	912	953	994	1035	1076	1117	1158	1199
2	913	954	995	1036	1077	1118	1159	1200
3	914	955	996	1037	1078	1119	1160	1201
4	915	956	997	1038	1079	1120	1161	1202
5	916	957	998	1039	1080	1121	1162	1203
6	917	958	999	1040	1081	1122	1163	1204
7	918	959	1000	1041	1082	1123	1164	1205
8	919	960	1001	1042	1083	1124	1165	1206
9	920	961	1002	1043	1084	1125	1166	1207
0	921	962	1003	1044	1085	1126	1167	1208
	922	963	1004	1045	1086	1127	1168	1209
	923	964	1005	1046	1087	1128	1169	1210
	924	965	1006	1047	1088	1129	1170	1211
	925	966	1007	1048	1089	1130	1171	1212
	926	967	1008	1049	1090	1131	1172	1213
	927	968	1009	1050	1091	1132	1173	1214
	928	969	1010	1051	1092	1133	1174	1215
	929	970	1011	1052	1093	1134	1175	1216
	930	971	1012	1053	1094	1135	1176	1217
	931	972	1013	1054	1095	1136	1177	1218
	932	973	1014	1055	1096	1137	1178	1219
	933	974	1015	1056	1097	1138	1179	1220
	934	975	1016	1057	1098	1139	1180	1221
	935	976	1017	1058	1099	1140	1181	1222
	936	977	1018	1059	1100	1141	1182	1223
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	938	979	1020	1061	1102	1143	1184	1225
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	942	983	1024	1065	1106	1147	1188	1229
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1289	1330	1371	1412	1453	1494	1535	1576	1617
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1643	1684	1725	1766	1807	1848	1889	1930	1971
1644	1685	1726	1767	1808	1849	1890	1931	1972
1645	1686	1727	1768	1809	1850	1891	1932	1973
1646	1687	1728	1769	1810	1851	1892	1933	1974
1647	1688	1729	1770	1811	1852	1893	1934	1975
1648	1689	1730	1771	1812	1853	1894	1935	1976
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1664	1705	1746	1787	1828	1869	1910	1951	1992
1665	1706	1747	1788	1829	1870	1911	1952	1993
1666	1707	1748	1789	1830	1871	1912	1953	1994
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1668	1709	1750	1791	1832	1873	1914	1955	1996
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1671	1712	1753	1794	1835	1876	1917	1958	1999
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1676	1717	1758	1799	1840	1881	1922	1963	2004
1677	1718	1759	1800	1841	1882	1923	1964	2005
1678	1719	1760	1801	1842	1883	1924	1965	2006
1679	1720	1761	1802	1843	1884	1925	1966	2007
1680	1721	1762	1803	1844	1885	1926	1967	2008
1681	1722	1763	1804	1845	1886	1927	1968	2009

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2011	2052	2093	2134	2175	2216	2257	2298	2339
2012	2053	2094	2135	2176	2217	2258	2299	2340
2013	2054	2095	2136	2177	2218	2259	2300	2341
2014	2055	2096	2137	2178	2219	2260	2301	2342
2015	2056	2097	2138	2179	2220	2261	2302	2343
2016	2057	2098	2139	2180	2221	2262	2303	2344
2017	2058	2099	2140	2181	2222	2263	2304	2345
2018	2059	2100	2141	2182	2223	2264	2305	2346
2019	2060	2101	2142	2183	2224	2265	2306	2347
2020	2061	2102	2143	2184	2225	2266	2307	2348
2021	2062	2103	2144	2185	2226	2267	2308	2349
2022	2063	2104	2145	2186	2227	2268	2309	2350
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2024	2065	2106	2147	2188	2229	2270	2311	2352
2025	2066	2107	2148	2189	2230	2271	2312	2353
2026	2067	2108	2149	2190	2231	2272	2313	2354
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2035	2076	2117	2158	2199	2240	2281	2322	2363
2036	2077	2118	2159	2200	2241	2282	2323	2364
2037	2078	2119	2160	2201	2242	2283	2324	2365
2038	2079	2120	2161	2202	2243	2284	2325	2366
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2045	2086	2127	2168	2209	2250	2291	2332	2373
2046	2087	2128	2169	2210	2251	2292	2333	2374
2047	2088	2129	2170	2211	2252	2293	2334	2375
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2049	2090	2131	2172	2213	2254	2295	2336	2377
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2	25	48	71	94	117	140
3	26	49	72	95	118	141
4	27	50	73	96	119	142
5	28	51	74	97	120	143
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8	31	54	77	100	123	146
9	32	55	78	101	124	147
0	33	56	79	102	125	148
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2	35	58	81	104	127	150
3	36	59	82	105	128	151
4	37	60	83	106	129	152
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6	39	62	85	108	131	154
7	40	63	86	109	132	155
8	41	64	87	110	133	156
9	42	65	88	111	134	157
0	43	66	89	112	135	158
1	44	67	90	113	136	159
2	45	68	91	114	137	160
3	46	69	92	115	138	161

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32	185	208	231	254	277
33	186	209	232	255	278
34	187	210	233	256	279
35	188	211	234	257	280
36	189	212	235	258	281
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38	191	214	237	260	283
39	192	215	238	261	284
70	193	216	239	262	285
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438 461 484 507 530 553
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576 599 622 645 668 691
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352 875 898 921 944 967
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1006	1029	1052	1075	1098
1007	1030	1053	1076	1099
1008	1031	1054	1077	1100
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1010	1033	1056	1079	1102
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II. Catalogue of the Orthoptera of North America described previous to 1867. Prepared for the Smithsonian Institution. By Samuel H. Scudder.

III. Land and Fresh-Water Shells of North America. Part I. Pulmonata Geophila. By W. G. Binney and T. Bland.

IV. Arrangement of Families of Birds. Adopted provisionally by the Smithsonian Institution.

V. Circular to Officers of the Hudson's Bay Company.

VI. Suggestions Relative to Objects of Scientific Investigation in Russian America.

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VIII. Circular to Entomologists.

IX. Circular Relative to Collections of Birds from Middle and South America.

X. Smithsonian Museum Miscellanea.

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